

# Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area at Fort Bragg, North Carolina

## *Final Report* *Volume 2 of 2*

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SYSTEMS CORP PROJECT #94013.05

April 28, 1995



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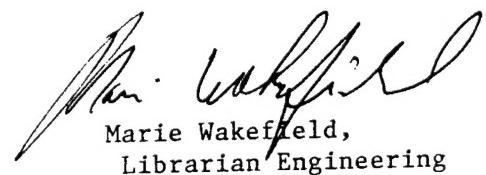


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A handwritten signature in black ink, appearing to read "Marie Wakefield".

Marie Wakefield,  
Librarian Engineering

## **8 ECO - 3 CALCULATIONS**

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-3: Water Conservation Improvement. For this ECO, four different options were considered. These options include:

1. Water-Saving Toilets
2. Water-Saving Urinals
3. Spring-Loaded Faucets
4. Water-Saving Showerheads

A single life-cycle cost analysis and cost estimate was performed for each of the four options which grouped all buildings together. A single life-cycle cost analysis was performed combining all four options as well.

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## **8 ECO - 3 CALCULATIONS**

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

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## LIFE CYCLE COST ANALYSIS SUMMARY FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

<b>DISCRETE PORTION NAME:</b>	Fort Bragg, NC
<b>PROJECT NAME:</b>	Water Conservation Project in Historic Red Brick Area
<b>TOTAL INVESTMENT:</b>	\$101,301
<b>MBTU/YEAR SAVED:</b>	7,806 <del>2287</del>
<b>DISCOUNTED ENERGY SAVINGS:</b>	\$814,496
<b>DISCOUNTED DEMAND SAVINGS:</b>	0
<b>TOTAL ENERGY SAVINGS:</b>	\$814,496
<b>TOTAL NON-ENERGY SAVINGS:</b>	\$98,059
<b>FIRST YEAR DOLLAR SAVINGS:</b>	\$50,451 <del>2287</del>
<b>SIMPLE PAYBACK IN YEARS:</b>	2.01
<b>TOTAL NET SAVINGS:</b>	\$912,555
<b>SAVINGS TO INVESTMENT RATIO:</b>	9.01

### **REQUIREMENT:**

This project requires replacement of high-volume toilets and urinals with water saving toilets (1.6 gal/flush for tank type, 3.5 gal/flush for flush type) and water-saving urinals (1.0 gal/flush). Also required is a retrofit of existing high-volume faucets and showerheads with water saving spring-loaded faucets and water savings showerheads. Upon completing this water-conservation project Fort Bragg will save 2287 MWH of energy and save \$50,451 annually which will help Fort Bragg meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

### **DESCRIPTION OF PROPOSED CONSTRUCTION:**

This project consists of installing water-saving urinals, spring-loaded faucets and water-saving showerheads.

### **CURRENT CONDITIONS:**

Approximately \$50,451 in energy and water is wasted each year at Fort Bragg by continuing to use old-technology water-consuming devices. At this rate a more efficient system would pay for itself in approximately 2.01 years.

### **IMPACT IF NOT PROVIDED:**

If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 2.01 years enough to purchase the more efficient water-conserving products. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).

**ECO - 3:**  
**WATER**  
**CONSERVATION**  
**PROJECTS**

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO3  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES  
 FISCAL YEAR 95 DISCRETE PORTION NAME: COMBINED ECO S  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 92091.
B. SIOH	\$ 4605.
C. DESIGN COST	\$ 4605.
D. TOTAL COST (1A+1B+1C)	\$ 101301.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 101301.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	2287.	\$ 43861.	18.57	\$ 814496.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		2287.	\$ 43861.		\$ 814496.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 6590.			
(1) DISCOUNT FACTOR (TABLE A)	14.88			
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 98059.			
B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-)	YR OC	DISCNT FACTR	DISCOUNTED SAVINGS (+) / COST (-) (4)
d. TOTAL	\$ 0.			0.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4)	\$ 98059.			
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))	\$ 50451.			
5. SIMPLE PAYBACK PERIOD (1G/4)	2.01 YEARS			
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)	\$ 912555.			
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY)	9.01			
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):	14.97 %			

**ECO - 3A:**  
**WATER - SAVING**  
**TOILETS**

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 STUDY: ECO3  
 LCCID FY95 (92)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES  
 FISCAL YEAR 95 DISCRETE PORTION NAME: WATER CLOSETS  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 13556.
B. SIOH	\$ 678.
C. DESIGN COST	\$ 678.
D. TOTAL COST (1A+1B+1C)	\$ 14912.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 14912.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994		UNIT COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED
FUEL		\$/ MWH(1)	MWH/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)
A. ELECT	\$ 34.95		0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18		0.	\$ 0.	18.57	\$ 0.
C. RESID	\$ .00		0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45		0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00		0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00		0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS				\$ 0.	14.88	\$ 0.
N. TOTAL			0.	\$ 0.		\$ 0.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)					\$ 1721.
(1) DISCOUNT FACTOR (TABLE A)				14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)					\$ 25608.

B. NON RECURRING SAVINGS (+) / COSTS (-)					
ITEM	SAVINGS (+)	YR	DISCNT	DISCOUNTED	
	COST (-)	OC	FACTR	SAVINGS (+) /	
d. TOTAL	\$ 0.		(3)	COST (-) (4)	

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 0.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE)) \$ 1721.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.66 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 25608.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.72  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

WATER CLOSETS

BUILDING	L/FLUSH EXISTING	L/FLUSH PROPOSED	NUMBER OF USERS	FIXTURE QUANTITY	YEAR	DAYS / FLUSHES / DAY	/ ANNUAL WATER SAVINGS	ANNUAL DOLLAR SAVINGS	INITIAL COST [\$]
1105	17.03	13.25	127	16	365	508	701815	\$226.34	\$969.00
1120	17.03	13.25	195	21	250	780	738075	\$238.03	\$1,271.00
1127	17.03	13.25	175	33	250	700	662375	\$213.62	\$1,997.00
1133	17.03	13.25	90	12	250	360	340650	\$109.86	\$727.00
1138	17.03	13.25	180	15	365	720	994698	\$320.79	\$908.00
1242	17.03	13.25	60	6	365	240	331566	\$106.93	\$363.00
1326	17.03	13.25	67	15	250	268	253595	\$81.78	\$908.00
1333	17.03	13.25	25	4	250	100	94625	\$30.52	\$242.00
1434	17.03	13.25	25	6	250	100	94625	\$30.52	\$363.00
1549	17.03	13.25	13	6	250	52	49205	\$15.87	\$363.00
1728	17.03	13.25	100	36	250	400	378500	\$122.07	\$2,178.00
1731	17.03	13.25	126	54	365	504	696289	\$224.55	\$3,267.00

\$1,720.87 \$13,556.00

**ECO - 3B:**  
**WATER - SAVING**  
**URINALS**

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO3  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES  
 FISCAL YEAR 95 DISCRETE PORTION NAME: URINALS  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 6564.
B. SIOH	\$ 328.
C. DESIGN COST	\$ 328.
D. TOTAL COST (1A+1B+1C)	\$ 7220.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 7220.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	0.	\$ 0.	18.57	\$ 0.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		0.	\$ 0.		\$ 0.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 757.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 11264.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-)	YR OC	DISCNT FACTR	DISCOUNTED SAVINGS (+) / COST (-) (4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 11264.
--	-----------

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 757.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.54 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 11264.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.56  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

## URINALS

BUILDING	L/FLUSH EXISTING	L/FLUSH PROPOSED	NUMBER OF USERS	FIXTURE QUANTITY	YEARS /	FLUSHES / DAY	ANNUAL WATER SAVINGS	ANNUAL DOLLAR SAVINGS	INITIAL COST [\$]
1105	5.68	3.79	127	9	365	508	350907	\$113.17	\$579.00
1120	5.68	3.79	125	6	250	500	236563	\$76.29	\$387.00
1127	5.68	3.79	125	12	250	500	236563	\$76.29	\$773.00
1133	5.68	3.79	40	3	250	160	75700	\$24.41	\$192.00
1138	5.68	3.79	180	18	365	720	497349	\$160.40	\$1,158.00
1242	5.68	3.79	60	3	365	240	165783	\$53.47	\$192.00
1326	5.68	3.79	67	6	250	268	126798	\$40.89	\$387.00
1333	5.68	3.79	25	2	250	100	47313	\$15.26	\$129.00
1434	5.68	3.79	25	1	250	100	47313	\$15.26	\$64.00
1549	5.68	3.79	13	6	250	52	24603	\$7.93	\$387.00
1728	5.68	3.79	100	18	250	400	189250	\$61.03	\$1,158.00
1731	5.68	3.79	126	18	365	504	348144	\$112.28	\$1,158.00

756.7 \$6,564.00

**ECO - 3C:  
SPRING - LOADED  
FAUCETS**

## LIFE CYCLE COST ANALYSIS SUMMARY

**STUDY: ECO3**

LCCID FY95 (92)

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)  
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES  
FISCAL YEAR 95 DISCRETE PORTION NAME: SPRING LOADED FAUCETS  
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

## 1. INVESTMENT

A. CONSTRUCTION COST	\$	68179.
B. SIOH	\$	3409.
C. DESIGN COST	\$	3409.
D. TOTAL COST (1A+1B+1C)	\$	74997.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.
F. PUBLIC UTILITY COMPANY REBATE	\$	0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$	74997.

## 2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	122.	\$ 2330.	18.57	\$ 43275.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		122.	\$ 2330.		\$ 43275.

### 3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-) \$ 275.  
     (1) DISCOUNT FACTOR (TABLE A) 14.88  
     (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 4092.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+)	YR	DISCNT	DISCOUNTED
	COST (-)	OC	FACTR	SAVINGS (+) / COST (-) (4)
	(1)	(2)	(3)	

d. TOTAL

§ 0.

DISCNT  
FACTR  
(3)

DISCOUNTED  
SAVINGS (+) /  
COST (-) (4)

0

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 4092.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 2605.

## 5. SIMPLE PAYBACK PERIOD (1G/4)

28.79 YEARS

#### 6 TOTAL NET DISCOUNTED SAVINGS (2N5+3C)

S 47367.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =  
(IF < 1 PROJECT DOES NOT QUALIFY)

#### 8 ADJUSTED INTERNAL RATE OF RETURN (AIRR):

INSTALL SPRING LOADED FAUCETS

BUILDING DAYS / YEAR	FIXTURE QUANTITY	NUMBER OF USERS	FLOW RATE [L/MIN]	CURRENT USE [L/YR]	PROPOSED USE [L/YR]	WATER SAVINGS [L/YR]	WATER SAVINGS [\$/YR]	OIL SAVINGS [MW-HR/YR]	INITIAL COST [\$]
1105	365	20	127	9.5	550466	438518	111947	\$36.10	16.0
1120	250	25	195	9.5	578906	461175	117731	\$37.97	16.8
1127	250	33	175	9.5	519531	413875	105656	\$34.07	15.1
1133	250	12	90	9.5	267188	212850	54338	\$17.52	7.8
1138	365	43	180	9.5	780188	621522	158666	\$51.17	22.6
1242	365	6	60	9.5	260063	207174	52889	\$17.06	7.5
1326	250	17	67	9.5	198906	158455	40451	\$13.05	5.8
1333	250	3	25	9.5	74219	59125	15094	\$4.87	2.2
1434	250	3	25	9.5	74219	59125	15094	\$4.87	2.2
1549	250	7	13	9.5	38594	30745	7849	\$2.53	1.1
1728	250	45	100	9.5	296875	236500	60375	\$19.47	8.6
1731	365	54	126	9.5	546131	435065	111066	\$35.82	15.8
									13737

\$274.50      121.5 \$68,179.00

**ECO - 3D:  
WATER - SAVING  
SHOWERHEADS**

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO3  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 ECO 3 : WATER CONSERVATION OPPORTUNITIES  
 FISCAL YEAR 95 DISCRETE PORTION NAME: LOW FLOW SHOWERHEADS  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 3792.
B. SIOH	\$ 190.
C. DESIGN COST	\$ 190.
D. TOTAL COST (1A+1B+1C)	\$ 4172.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 4172.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994				
FUEL	UNIT COST \$ / MWH(1)	SAVINGS MWH/YR(2)	ANNUAL SAVINGS(3)	DISCOUNT FACTOR(4)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08
B. DIST	\$ 19.18	2165.	\$ 41530.	18.57
C. RESID	\$ .00	0.	\$ 0.	21.02
D. NAT G	\$ 13.45	0.	\$ 0.	18.58
E. COAL	\$ .00	0.	\$ 0.	16.83
F. PPG	\$ .00	0.	\$ 0.	17.38
M. DEMAND SAVINGS			\$ 0.	14.88
N. TOTAL		2165.	\$ 41530.	\$ 771221.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 3837.			
(1) DISCOUNT FACTOR (TABLE A)	14.88			
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 57095.			
B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS(+) COST(-)	YR OC	DISCNT FACTR	DISCOUNTED SAVINGS(+) / COST(-) (4)
d. TOTAL	\$ 0.			0.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 57095.			
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))	\$ 45367.			
5. SIMPLE PAYBACK PERIOD (1G/4)	.09 YEARS			
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)	\$ 828315.			
7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = (IF < 1 PROJECT DOES NOT QUALIFY)	198.54			
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) :	34.19 %			

INSTALL LOW FLOW SHOWER HEADS

BUILDING	DAY'S / YEAR	FIXTURE QUANTITY	NUMBER OF USERS	FLOW RATE [L/MIN]	CURRENT USE [L/YR]	PROPOSED USE [L/YR]	WATER SAVINGS [L/YR]	WATER SAVINGS [\$/YR]	OIL SAVINGS [MW-HR/YR]
1105	365	14	127	9.5	3522980	3522980	0	\$0.00	0.0
1120	250	6	20	9.5	380000	380000	0	\$0.00	0.0
1127	250	6	20	9.5	380000	380000	0	\$0.00	0.0
1133	250	2	4	27.4	219200	76000	143200	\$46.18	26.1
1138	365	20	180	28.4	14927040	4993200	9933840	\$3,203.66	1808.0
1242	365	4	60	17	2978400	1664400	1314000	\$423.77	239.1
1326	250	11	22	17.4	765600	418000	347600	\$112.10	63.3
1333	250	0	0	0	0	0	0	\$0.00	0.0
1434	250	0	0	0	0	0	0	\$0.00	0.0
1549	250	0	0	0	0	0	0	\$0.00	0.0
1728	250	3	6	22.7	272400	114000	158400	\$51.08	28.8
1731	365	42	126	9.5	3495240	3495240	0	\$0.00	0.0

2165.3

\$3,836.80

INITIAL COST [\$]
190
1897
379
1042
284

\$3,792.00

## 9 ECO - 4 CALCULATIONS

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-4:  
Install New Gas Heating Systems.

A single life-cycle cost analysis and cost estimate was performed for each building.

## 9 ECO - 4 CALCULATIONS

LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC

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## LIFE CYCLE COST ANALYSIS SUMMARY FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

DISCRETE PORTION NAME:	Fort Bragg, NC
PROJECT NAME:	Replace Oil Heat with Natural Gas Heat in Historic Red Brick Area
TOTAL INVESTMENT:	\$376,059
MBTU/YEAR SAVED:	3,754
DISCOUNTED ENERGY SAVINGS:	\$1,199,337
DISCOUNTED DEMAND SAVINGS:	0
TOTAL ENERGY SAVINGS:	\$1,199,337
TOTAL NON-ENERGY SAVINGS:	\$155,400
FIRST YEAR DOLLAR SAVINGS:	\$74,725
SIMPLE PAYBACK IN YEARS:	5.03
TOTAL NET SAVINGS:	\$1,354,737
SAVINGS TO INVESTMENT RATIO:	3.6

F60  
4

### REQUIREMENT:

This project requires installing new natural gas boilers to replace oil-fired boilers in nine buildings in the Historic Red Brick Area. Also included is the use of natural gas-fired infrared heaters in the high bay areas of Shop Building 2-1549 to replace existing unit heaters. The project requires extension of a six-inch gas main located about 500 feet from the vicinity. The completion of this project at Fort Bragg will save 1100 MWH of energy and save \$74,725 annually which will help Fort Bragg meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

### DESCRIPTION OF PROPOSED CONSTRUCTION:

This project consists of replacing oil-fired boilers with new natural gas boilers in nine buildings and replacing unit heaters with natural gas-fired infrared heaters in bldg 2-1549.

### CURRENT CONDITIONS:

The energy lost due to the current usage of inefficient oil-fired heating systems is in excess of 1100 MWH per year at a cost of \$74,725 per year. At this rate a more energy efficient heating system would pay for itself in approximately 3.6 years.

### IMPACT IF NOT PROVIDED:

If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 3.6 years enough to purchase the more efficient heating system. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).



GAS MAIN  
EXTENSION  
COST  
ESTIMATE

09-Jan-95

MeansData for Lotus

Page 1

=====
 Estimate: RED BRICK AREA Date: 03-Jan-95
 Description: COST ESTIMATE (100% OF REQ'D 4" MAIN)
 Project: LIMITED EEAP(RDBRKBid Date:
 Location: FORT BRAGG, N.C. Job #: 94013.05
 Sq. footage: MAIN GAS LINE City indx:Raleigh, NC
 =====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0205541750	PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK					270.00	S.Y.
Unit values	0.10	0.00	1.73	2.50	0.00		4.23
Totals	25.65	\$0	\$466	\$676	\$0		\$1,142
0222541900	TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD					45.00	C.Y.
Unit values	0.09	0.00	1.44	0.55	0.00		1.99
Totals	4.01	\$0	\$65	\$25	\$0		\$90
0222582800	TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D					2400.00	L.F.
Unit values	0.01	0.00	0.20	0.20	0.00		0.39
Totals	24.00	\$0	\$470	\$470	\$0		\$940
0222700500	HORZ BORNG >100' RRWK .5"WALL 24"DIA CASING					100.00	L.F.
Unit values	9.14	42.93	165.09	125.10	0.00		333.12
Totals	914.30	\$4,293	\$16,509	\$12,510	\$0		\$33,312
0251040160	ASPHALTIC CONCRETE PAVEMENT, PAVING, BINDER COURSE, 3" THICK					270.00	S.Y.
Unit values	0.02	3.98	0.31	0.28	0.00		4.58
Totals	4.86	\$1,074	\$85	\$76	\$0		\$1,235
0251040340	ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 1-1/2" THICK					270.00	S.Y.
Unit values	0.01	2.20	0.22	0.20	0.00		2.63
Totals	3.24	\$594	\$60	\$55	\$0		\$709
0260120200	BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK					45.00	C.Y.
Unit values	0.16	3.79	2.79	1.13	0.00		7.71
Totals	7.20	\$170	\$126	\$51	\$0		\$347
0260120500	BEDDING, PLACING IN TRENCH					45.00	C.Y.
Unit values	0.09	0.00	1.44	0.55	0.00		1.99
Totals	4.01	\$0	\$65	\$25	\$0		\$90
0266907800	CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER					1.00	Ea.

09-Jan-95

MeansData for Lotus

Page 2

Unit values	1.56	404.00	29.36	4.89	0.00	438.25
Totals	1.56	\$404	\$29	\$5	\$0	\$438

0268520350      GAS SERVICE & DISTRIB PIPINGPOLYETHYLENE, 60P-  
SI 4"DIA, SDR11, CPLG@40FT      2400.00 L.F.

Unit values	0.11	3.79	2.03	0.34	0.00	6.15
Totals	259.20	\$9,090	\$4,861	\$817	\$0	\$14,768

09-Jan-95

MeansData for Lotus

Page 3

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITEWORK		1249	\$15,625	\$22,736	\$14,710	\$0	\$53,071
1562600142	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 4" PIPE SIZE					1.00 Ea.	
Unit values		2.00	1448.55	30.86	0.00	0.00	1479.41
Totals		2.00	\$1,449	\$31	\$0	\$0	\$1,480
U15 MECHANICAL		2	\$1,449	\$31	\$0	\$0	\$1,480

09-Jan-95

MeansData for Lotus

Page 4

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Line #	Description						
	Manhours	Matl	Labor	Equipment	Sub	Total	
ESTIMATE TOTAL	1251	\$17,074	\$22,767	\$14,710	\$0	\$54,551	
SALES TAX	0.00%	\$0					
MATL MARKUP	0.00%	\$0					
LABOR MARKUP	0.00%		\$0				
EQUIPT MARKUP	0.00%			\$0			
SUB MARKUP	0.00%				\$0		
TOTAL BEFORE CONTINGENC		\$17,074	\$22,767	\$14,710	\$0	\$54,551	
CONTINGENCY	10.00%					\$5,455	
BOND	0.00%					\$0	
PROFIT	10.00%					\$5,455	
JOB TOTAL						\$65,461	

09-Jan-95

MeansData for Lotus

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 Estimate: RED BRICK AREA Date: 03-Jan-95  
 Description: COST ESTIMATE (100% OF REQ'D 4" MAIN)  
 Project: LIMITED EEAP(RDBRKBid Date:  
 Location: FORT BRAGG, N.C. Job #: 94013.05  
 Sq. footage: MAIN GAS LINE City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITWORK	1249	\$15,625	\$22,736	\$14,710	\$0	\$53,071
U15 MECHANICAL	2	\$1,449	\$31	\$0	\$0	\$1,480
<b>TOTAL</b>	<b>1251</b>	<b>\$17,074</b>	<b>\$22,767</b>	<b>\$14,710</b>	<b>\$0</b>	<b>\$54,551</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	0.00%		\$0			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	0.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>		<b>\$17,074</b>	<b>\$22,767</b>	<b>\$14,710</b>	<b>\$0</b>	<b>\$54,551</b>
CONTINGENCY	10.00%					\$5,455
BOND	0.00%					\$0
<b>PROFIT</b>	<b>10.00%</b>					<b>\$5,455</b>
<b>JOB TOTAL</b>						<b>\$65,461</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

**1. INVESTMENT**

A. CONSTRUCTION COST	\$ 24679.
B. SIOH	\$ 907.
C. DESIGN COST	\$ 907.
D. TOTAL COST (1A+1B+1C)	\$ 26493.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 26493.

**2. ENERGY SAVINGS (+) / COST (-)**

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	389.	\$ 7466.	18.57	\$ 138647.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-359.	\$ -4833.	18.58	\$ -89797.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		30.	\$ 2633.		\$ 48850.

**3. NON ENERGY SAVINGS (+) / COST (-)**

**A. ANNUAL RECURRING (+/-)**

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 500.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 7440.

**B. NON RECURRING SAVINGS (+) / COSTS (-)**

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 3633.

5. SIMPLE PAYBACK PERIOD (1G/4) 7.29 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 64390.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)=  
 (IF < 1 PROJECT DOES NOT QUALIFY) 2.43

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 7.68 %

1242.SIM

1/10/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 9/1995

14: 2: 8 PDL RUN 1

BUILDING 1242

BASE CASE

PRESENT ENERGY USAGE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
-----		
TOTAL	1613.84	1328.59

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1242EC04.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

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HISTORIC RED BRICK BLDG AREA  
ECO-4

DOE-2.1C 1/10/1995 16:12:16 PDL RUN 1  
NEW NG BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY NATURAL-GAS

CATEGORY OF USE

SPACE HEAT	68.66	1226.39
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
-----		
TOTAL	1613.84	1226.39

TOTAL SITE ENERGY 2946.49 MBTU 153.1 KBTU/SQFT-YR GROSS-AREA 153.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6391.86 MBTU 332.2 KBTU/SQFT-YR GROSS-AREA 332.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1242 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551153320	HTG BR GAS CI STD HTWR GOP 2000 MBH						
Unit values	84.21	12487.50	1376.38	0.00	1.00 Ea.	0.00	13863.88
Totals	84.21	\$12,488	\$1,376	\$0	\$0	\$0	\$13,864
U15 MECHANICAL	85	\$12,488	\$1,376	\$0	\$0	\$0	\$13,864

12-Jan-95

MeansData for Lotus

Page 2

## Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	85	\$12,488	\$1,376	\$0	\$0	\$13,864
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$303			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$12,488	\$1,679	\$0	\$0	\$14,167
CONTINGENCY	15.00%					\$2,125
BOND	3.00%					\$425
PROFIT	10.00%					\$1,417
JOB TOTAL						\$18,133

=====
Estimate: BLDG 1242 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	85	\$12,488	\$1,376	\$0	\$0	\$13,864
TOTAL	85	\$12,488	\$1,376	\$0	\$0	\$13,864
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$303			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENCY		\$12,488	\$1,679	\$0	\$0	\$14,167
CONTINGENCY	15.00%					\$2,125
BOND	3.00%					\$425
PROFIT	10.00%					\$1,417
JOB TOTAL						\$18,133

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO4  
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)  
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326  
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

## 1. INVESTMENT

A. CONSTRUCTION COST	\$	31659.
B. SIOH	\$	1256.
C. DESIGN COST	\$	1256.
D. TOTAL COST (1A+1B+1C)	\$	34171.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.
F. PUBLIC UTILITY COMPANY REBATE	\$	0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$	

#### 2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED
	\$/ MWH(1)	MWH/YR(2)	SAVINGS(3)	FACTOR(4)	SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	1490.	\$ 28572.	18.57	\$ 530590.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-1375.	\$ -18499.	18.58	\$ -343709.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		114.	\$ 10074.		\$ 186881.

### 3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-) \$ 500.  
     (1) DISCOUNT FACTOR (TABLE A) 14.88  
     (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)					
	ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1.	FUEL OIL TANK	\$ 10000.	7	.81	8100.
d.	TOTAL	\$ 10000.			8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3BD1/(YRS ECONOMIC LIFE))S 11074.

## 5. SIMPLE PAYBACK PERIOD (1G/4)

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) S 202421.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 5.92

(IF THE PROSPECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 12.58 %

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 12.58 %

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 12.58 %

FT BRAGG ENERGY STUDY  
BUILDING 1-1326 HQ BLDG  
REF ID: BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 14:16:42 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	285.53	5085.34
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
<hr/>	<hr/>	<hr/>
TOTAL	6248.75	5085.34

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1326EC04.SIM

1/11/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995 14:44:50 PDL RUN 1

BUILDING 1-1326 HQ BLDG

ECO-4

NEW NG BOILER

REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	285.53	4694.16
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
-----		
TOTAL	6248.75	4694.16

TOTAL SITE ENERGY 10942.78 MBTU 185.4 KBTU/SQFT-YR GROSS-AREA 185.4 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 23458.78 MBTU 397.4 KBTU/SQFT-YR GROSS-AREA 397.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1326 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551153360	HTG BR GAS CI STD HTWR GOP 2856 MBH						1.00 Ea.
Unit values	96.97	17682.30	1588.13	0.00	0.00	0.00	19270.43
Totals	96.97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$349			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$17,682		\$1,937		\$0	\$19,619
CONTINGENCY	15.00%					\$0	\$2,943
BOND	3.00%						\$589
PROFIT	10.00%						\$1,962
JOB TOTAL							\$25,113

=====
Estimate: BLDG 1326 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
TOTAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$349			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$17,682	\$1,937	\$0	\$0	\$19,619
CONTINGENCY	15.00%					\$2,943
BOND	3.00%					\$589
PROFIT	10.00%					\$1,962
JOB TOTAL						\$25,113

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333  
 ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 17447.
B. SIOH	\$ 545.
C. DESIGN COST	\$ 545.
D. TOTAL COST (1A+1B+1C)	\$ 18537.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 18537.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	261.	\$ 5009.	18.57	\$ 93025.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-241.	\$ -3243.	18.58	\$ -60249.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		20.	\$ 1767.		\$ 32777.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 500.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE)) \$ 2767.

5. SIMPLE PAYBACK PERIOD (1G/4) 6.70 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 48317.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 2.61  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 8.05 %

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 3/1995 15:32: 6 PDL RUN 1

DING 1-1333

BASE CASE

PRESENT ENERGY USAGE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE- RALEIGH, NC

## ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT 79.52 891.42

SPACE COOL 347.65 0.00

HVAC AUX 192.92 0.00

DOM HOT WTR 0.00 0.00

AUX SOLAR 0.00 0.00

LIGHTS 303.25 0.00

VERT TRANS 0.00 0.00

MISC EQUIP 324.51 0.00

----- -----

TOTAL 1247.85 891.42

TOTAL SITE ENERGY 2139.24 MBTU 162.3 KBTU/SQFT-YR GROSS-AREA 162.3 KBTU/SQFT-YR NET-AREA

TOTAL SOURCE ENERGY 4638.62 MBTU 351.9 KBTU/SQFT-YR GROSS-AREA 351.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1333EC04.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1333  
RE-BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

Page 1

HISTORIC RED BRICK BLDG AREA  
ECO-4

DOE-2.1C 1/10/1995 14:42:50 PDL RUN 1  
NEW NG BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY NATURAL-GAS

CATEGORY OF USE

SPACE HEAT	79.52	822.85
SPACE COOL	347.65	0.00
HVAC AUX	192.92	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
-----		
TOTAL	1247.85	822.85

TOTAL SITE ENERGY 2070.67 MBTU 157.1 KBTU/SQFT-YR GROSS-AREA 157.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 4570.05 MBTU 346.7 KBTU/SQFT-YR GROSS-AREA 346.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1333 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
1551153260			GAS HOT WATER, CI BOILER, 1088 MBH		1.00 Ea.	
Unit values	64.00	7242.75	1043.63	0.00	0.00	8286.38
Totals	64.00	\$7,243	\$1,044	\$0	\$0	\$8,287
U15 MECHANICAL	64	\$7,243	\$1,044	\$0	\$0	\$8,287

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	64	\$7,243	\$1,044	\$0	\$0	\$8,287
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$230			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$7,243	\$1,274	\$0	\$0	\$8,517
CONTINGENCY	15.00%					\$1,278
BOND	3.00%					\$256
PROFIT	10.00%					\$852
JOB TOTAL						\$10,901

=====
 Estimate: BLDG 1333 ECO-4 Date: 22-Dec-94
 Description: INSTALL NATURAL GAS BOILER
 Project: ECIP / FEMP Bid Date:
 Location: FORT BRAGG NC Job #: 94013.05
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	64	\$7,243	\$1,044	\$0	\$0	\$8,287
TOTAL	64	\$7,243	\$1,044	\$0	\$0	\$8,287
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$230			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$7,243	\$1,274	\$0	\$0	\$8,517
CONTINGENCY	15.00%					\$1,278
BOND	3.00%					\$256
PROFIT	10.00%					\$852
JOB TOTAL						\$10,901

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO4  
 LCCID FY95 (92)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 31659.
B. SIOH	\$ 1256.
C. DESIGN COST	\$ 1256.
D. TOTAL COST (1A+1B+1C)	\$ 34171.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 34171.

2. ENERGY SAVINGS (+) / COST (-)

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	OCT 1994	DISCOUNTED SAVINGS (5)
				DISCOUNT FACTOR (4)	
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	1388.	\$ 26615.	18.57	\$ 494236.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-1281.	\$ -17228.	18.58	\$ -320096.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		107.	\$ 9387.		\$ 174140.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)	DISCNT	DISCOUNTED		
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	FACTR (3)	SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 15540.			
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE))	\$ 10387.			
5. SIMPLE PAYBACK PERIOD (1G/4)	3.29 YEARS			
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)	\$ 189680.			
7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = (IF < 1 PROJECT DOES NOT QUALIFY)	5.55			
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) :	12.22 %			

FT BRAGG ENERGY STUDY

BUILDING 2-1120

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 6/1995

9:26: 7 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
	-----	-----
TOTAL	3885.73	4735.99

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1120EC04.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1120  
RE[REDACTED] BEPS ESTIMATE

1/10/95

Page 1

HISTORIC RED BRICK BLDG AREA  
ECO-4

DOE-2.1C 1/10/1995 13:45:33 PDL RUN 1  
ING BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      NATURAL-GAS

**CATEGORY OF USE**

SPACE HEAT	181.42	4371.68
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
<hr/>	<hr/>	<hr/>
TOTAL	3885.73	4371.68

TOTAL SITE ENERGY	8257.25 MBTU	111.3 KBTU/SQFT-YR	GROSS-AREA	111.3 KBTU/SQFT-YR	NET-AREA
TOTAL SOURCE ENERGY	16040.07 MBTU	216.2 KBTU/SQFT-YR	GROSS-AREA	216.2 KBTU/SQFT-YR	NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1120 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
1551153360						
HTG BR GAS CI STD HTWR GOP 2856 MBH						
Unit values	96.97	17682.30	1588.13	0.00	0.00	19270.43
Totals	96.97	\$17,682	\$1,588	\$0	\$0	\$19,270
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$349			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$17,682		\$1,937		\$0	\$19,619
CONTINGENCY	15.00%						\$2,943
BOND	3.00%						\$589
PROFIT	10.00%						\$1,962
JOB TOTAL							\$25,113

=====
 Estimate: BLDG 1120 ECO-4 Date: 22-Dec-94  
 Description: INSTALL NATURAL GAS BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
TOTAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$349			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$17,682	\$1,937	\$0	\$0	\$19,619
CONTINGENCY	15.00%					\$2,943
BOND	3.00%					\$589
PROFIT	10.00%					\$1,962
JOB TOTAL						\$25,113

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

1. INVESTMENT  
 A. CONSTRUCTION COST \$ 33429.  
 B. SIOH \$ 1344.  
 C. DESIGN COST \$ 1344.  
 D. TOTAL COST (1A+1B+1C) \$ 36117.  
 E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.  
 F. PUBLIC UTILITY COMPANY REBATE \$ 0.  
 G. TOTAL INVESTMENT (1D - 1E - 1F) \$ 36117.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	1013.	\$ 19428.	18.57	\$ 360785.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-935.	\$ -12576.	18.58	\$ -233665.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		78.	\$ 6852.		\$ 127120.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)					\$ 500.
(1) DISCOUNT FACTOR (TABLE A)				14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)					\$ 7440.
B. NON RECURRING SAVINGS (+) / COSTS (-)					
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)	
1. FUEL OIL TANK	\$ 10000.	7	.81	8100.	
d. TOTAL	\$ 10000.			8100.	
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)				\$ 15540.	
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))				\$ 7852.	
5. SIMPLE PAYBACK PERIOD (1G/4)				4.60 YEARS	
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)				\$ 142660.	
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY)				3.95	
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):				10.32 %	

1127.SIM

12-28-94

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### FI BRIGG ENERGY STUDY

## HISTORIC RED BRICK BUILDING AREA

BUILDING 2-1127

BASE CASE

#### **SECTION 2: BPPS - ESTIMATED BUILDING ENERGY PERFORMANCE**

DOF-2.1C 12/22/1994

8:24:33 PDL RUN 1

PRESENT ENERGY USE

NOTICE  
NEITHER FILE

RALEIGH, NC

### **ENERGY TYPE**

IN SITE MBTU = ELECTRICITY FUEL=OIL

**CATEGORY OF USE**

SPACE HEAT	178.99	3457.19
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
<hr/>	<hr/>	<hr/>
TOTAL	4799.69	3457.19

TOTAL SITE ENERGY	8256.87 MBTU	142.9 KBTU/SQFT-YR	GROSS-AREA	142.9 KBTU/SQFT-YR	NET-AREA
TOTAL SOURCE ENERGY	17870.65 MBTU	309.2 KBTU/SQFT-YR	GROSS-AREA	309.2 KBTU/SQFT-YR	NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1127EC04.SIM

1/10/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1127

REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BUILDING AREA

ECO-4

DOE-2.1C 1/10/1995

NEW NG BOILER

13:40:27 PDL RUN 1

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	178.99	3191.26
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
	-----	-----
TOTAL	4799.69	3191.26

TOTAL SITE ENERGY 7990.93 MBTU 138.3 KBTU/SQFT-YR GROSS-AREA 138.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 17604.71 MBTU 304.6 KBTU/SQFT-YR GROSS-AREA 304.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====  
Estimate: BLDG 1127 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1551153380	HTG BR GAS CI STD HTWR GOP 3264 MBH					
Unit values	106.00	18881.10	1739.38	0.00	1.00 Ea.	0.00 20620.48
Totals	106.00	\$18,881	\$1,739	\$0	\$0	\$20,620
U15 MECHANICAL	106	\$18,881	\$1,739	\$0	\$0	\$20,620

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	106	\$18,881	\$1,739	\$0	\$0	\$20,620
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$383			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$18,881	\$2,122	\$0	\$0	\$21,003
CONTINGENCY	15.00%					\$3,150
BOND	3.00%					\$630
PROFIT	10.00%					\$2,100
JOB TOTAL						\$26,883

=====  
 Estimate: BLDG 1127 ECO-4 Date: 22-Dec-94  
 Description: INSTALL NATURAL GAS BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC  
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	106	\$18,881	\$1,739	\$0	\$0	\$20,620
TOTAL	106	\$18,881	\$1,739	\$0	\$0	\$20,620
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$383			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$18,881	\$2,122	\$0	\$0	\$21,003
CONTINGENCY	15.00%					\$3,150
BOND	3.00%					\$630
PROFIT	10.00%					\$2,100
JOB TOTAL						\$26,883

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1133  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

1. INVESTMENT  
 A. CONSTRUCTION COST \$ 31659.  
 B. SIOH \$ 1256.  
 C. DESIGN COST \$ 1256.  
 D. TOTAL COST (1A+1B+1C) \$ 34171.  
 E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.  
 F. PUBLIC UTILITY COMPANY REBATE \$ 0.  
 G. TOTAL INVESTMENT (1D - 1E - 1F) \$ 34171.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS			OCT 1994		
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	416.	\$ 7983.	18.57	\$ 148235.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-384.	\$ -5167.	18.58	\$ -96004.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		32.	\$ 2815.		\$ 52231.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)  
 (1) DISCOUNT FACTOR (TABLE A) \$ 500.  
 (2) DISCOUNTED SAVING/COST (3A X 3A1) 14.88 \$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)  
 ITEM SAVINGS (+) YR DISCNT DISCOUNTED  
 COST (-) OC FACTR SAVINGS (+) /  
 (1) (2) (3) COST (-) (4)  
 1. FUEL OIL TANK \$ 10000. 7 .81 8100.  
 d. TOTAL \$ 10000. 8100.  
 C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 3815.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.96 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 67771.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.98  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 6.59 %

1133.SIM

12 28 94

Page 1

FT BRAGG ENERGY STUDY

BUILDING 2-1133

REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 12/22/1994

13:29:34 PDL RCH 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	425.53	1420.44
SPACE COOL	947.02	0.00
HVAC AUX	103.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1011.38	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	379.22	0.00
	-----	-----
TOTAL	2866.64	1420.44

TOTAL SITE ENERGY      4286.99 MBTU      115.9 KBTU/SQFT-YR GROSS-AREA      115.9 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY      10028.71 MBTU      271.2 KBTU/SQFT-YR GROSS-AREA      271.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1133ECO4.SIM

1/10/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995

15:51:23 PDL RUN 1

BUILDING 2-1133

ECO-4

NEW NG BOILER

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	425.53	1311.18
SPACE COOL	947.02	0.00
HVAC AUX	103.49	0.00
DOM HOT WTR	.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1011.38	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	379.22	0.00
	-----	-----
TOTAL	2866.64	1311.18

TOTAL SITE ENERGY 4177.73 MBTU 113.0 KBTU/SQFT-YR GROSS-AREA 113.0 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 9919.44 MBTU 268.3 KBTU/SQFT-YR GROSS-AREA 268.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====  
Estimate: BLDG 1133 ECO-4 Date: 22-Dec-94

Description: INSTALL NATURAL GAS BOILER

Project: ECIP / FEMP Bid Date:

Location: FORT BRAGG NC Job #: 94013.05

Sq. footage: City indx:Raleigh, NC  
=====

Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
1551153360						
HTG BR GAS CI STD HTWR GOP	2856	MBH				
Unit values	96.97	17682.30	1588.13	0.00	1.00 Ea.	
Totals	96.97	\$17,682	\$1,588	\$0	0.00	19270.43
					\$0	\$19,270
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270

12-Jan-95

MeansData for Lotus

Page 2

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Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$349			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$17,682		\$1,937		\$0	\$19,619
CONTINGENCY	15.00%						\$2,943
BOND	3.00%						\$589
PROFIT	10.00%						\$1,962
JOB TOTAL							\$25,113

=====
Estimate: BLDG 1133 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
TOTAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$349			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$17,682	\$1,937	\$0	\$0	\$19,619
CONTINGENCY	15.00%					\$2,943
BOND	3.00%					\$589
PROFIT	10.00%					\$1,962
JOB TOTAL						\$25,113

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO4  
 LCCID FY95 (92)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 27356.
B. SIOH	\$ 1041.
C. DESIGN COST	\$ 1041.
D. TOTAL COST (1A+1B+1C)	\$ 29438.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 29438.

2. ENERGY SAVINGS (+) / COST (-)

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	OCT 1994	DISCOUNTED SAVINGS(5)
				DISCOUNT FACTOR(4)	
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	1122.	\$ 21514.	18.57	\$ 399515.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-1035.	\$ -13926.	18.58	\$ -258750.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		86.	\$ 7588.		\$ 140765.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)					\$ 500.
(1) DISCOUNT FACTOR (TABLE A)				14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)					\$ 7440.
B. NON RECURRING SAVINGS (+) / COSTS (-)					
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)		DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81		8100.
d. TOTAL	\$ 10000.				8100.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4)	\$ 15540.				
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE))	\$ 8588.				
5. SIMPLE PAYBACK PERIOD (1G/4)					3.43 YEARS
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)				\$ 156305.	
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY)					5.31
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):					11.97 %

FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART A (FIRST FLOOR)  
ESTIMATED BUILDING ENERGY PERFORMANCE

1138A.SIM  
DOE-2.1C 12/28/1994 10:15:52 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	398.05	1053.81
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1907.21	1053.81

TOTAL SITE ENERGY 2961.09 MBTU 91.3 KBTU/SQFT-YR GROSS-AREA 91.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6781.38 MBTU 209.1 KBTU/SQFT-YR GROSS-AREA 209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138B.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY  
BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART B (SECOND FLOOR)

DOE-2.1C 1/ 9/1995 14:13:37 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.62	873.22
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
	-----	-----
TOTAL	2263.21	873.22

TOTAL SITE ENERGY 3136.42 MBTU 165.3 KBTU/SQFT-YR GROSS-AREA 165.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 7669.62 MBTU 404.1 KBTU/SQFT-YR GROSS-AREA 404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 1-1138

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART C (THIRD FLOOR)

REPT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1138C.SIM  
DOE-2.1C 1/ 9/1995 14:58:48 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	63.02	1901.29
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.34	0.00
	-----	-----
TOTAL	2174.70	1901.29

TOTAL SITE ENERGY 4076.03 MBTU 214.8 KBTU/SQFT-YR GROSS-AREA 214.8 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 8432.04 MBTU 444.3 KBTU/SQFT-YR GROSS-AREA 444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138AEC4.SIM

1/10/95

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FT BRAGG ENERGY STUDY  
BUILDING 1-1138HISTORIC RED BRICK BLDG AREA  
ECO4 PART A (FIRST FLOOR)

DOE-2.1C 1/10/1995 14:18:43 PDL RUN 1

PORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

NEW NG BOILER

WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	398.05	972.75
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
<hr/>		
TOTAL	1907.21	972.75

TOTAL SITE ENERGY	2880.03 MBTU	88.8 KBTU/SQFT-YR GROSS-AREA	88.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6700.31 MBTU	206.6 KBTU/SQFT-YR GROSS-AREA	206.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138BEC4.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
RE-  
RE- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

Page 1

HISTORIC RED BRICK BLDG AREA  
ECO-4 PART B (SECOND FLOOR)

DOE-2.1C 1/10/1995 14:16:44 PDL RUN 1  
NEW NG BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY NATURAL-GAS

CATEGORY OF USE

SPACE HEAT	40.62	806.05
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
-----		
TOTAL	2263.21	806.05

TOTAL SITE ENERGY 3069.25 MBTU 161.7 KBTU/SQFT-YR GROSS-AREA 161.7 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 7602.45 MBTU 400.6 KBTU/SQFT-YR GROSS-AREA 400.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138CEC4.SIM

1/10/95

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FT BRAGG ENERGY STUDY  
BUILDING 1-1138HISTORIC RED BRICK BLDG AREA  
ECO-4 PART C (THIRD FLOOR)

DOE-2.1C 1/10/1995 14:17: 7 PDL RUN 1

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

NEW NG BOILER

WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	63.02	1755.04
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	569.34	0.00
<hr/>		
TOTAL	2174.70	1755.04

TOTAL SITE ENERGY	3929.78 MBTU	207.1 KBTU/SQFT-YR GROSS-AREA	207.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	8285.79 MBTU	436.6 KBTU/SQFT-YR GROSS-AREA	436.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1138 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551153340	HTG BR GAS CI STD HTWR GOP 2312 MBH						
Unit values	88.89	14485.50	1452.00	0.00	1.00 Ea.		
Totals	88.89	\$14,486	\$1,452	\$0	0.00 15937.50	\$0	\$15,938
U15 MECHANICAL	89	\$14,486	\$1,452	\$0	\$0		\$15,938

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		89	\$14,486	\$1,452	\$0	\$0	\$15,938
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$319			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$14,486		\$1,771		\$0	\$16,257
CONTINGENCY	15.00%						\$2,439
BOND	3.00%						\$488
PROFIT	10.00%						\$1,626
JOB TOTAL							\$20,810

=====
Estimate: BLDG 1138 ECO-4 Date: 22-Dec-94
Description: INSTALL NATURAL GAS BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	89	\$14,486	\$1,452	\$0	\$0	\$15,938
TOTAL	89	\$14,486	\$1,452	\$0	\$0	\$15,938
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$319			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$14,486	\$1,771	\$0	\$0	\$16,257
CONTINGENCY	15.00%					\$2,439
BOND	3.00%					\$488
PROFIT	10.00%					\$1,626
JOB TOTAL						\$20,810

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 86613.
B. SIOH	\$ 4003.
C. DESIGN COST	\$ 4003.
D. TOTAL COST (1A+1B+1C)	\$ 94619.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 94619.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	16.	\$ 545.	15.08	\$ 8217.
B. DIST	\$ 19.18	1115.	\$ 21386.	18.57	\$ 397136.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-618.	\$ -8319.	18.58	\$ -154561.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		512.	\$ 13612.		\$ 250791.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 500.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 14612.

5. SIMPLE PAYBACK PERIOD (1G/4)

6.48 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 266331.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =  
 (IF < 1 PROJECT DOES NOT QUALIFY) 2.81

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) :

8.47 %

1549.SIM

12 28 94

Page 1

FT BRAGG ENERGY STUDY  
BUILDING 2-1549HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SRT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCEDOE-2.1C 12/22/1994 14: 3:29 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	102.49	3805.53
SPACE COOL	0.00	0.00
HVAC AUX	52.17	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	94.60	0.00
<hr/>		
TOTAL	910.77	3805.53

TOTAL SITE ENERGY	4716.32 MBTU	205.1 KBTU/SQFT-YR GROSS-AREA	205.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6540.62 MBTU	284.4 KBTU/SQFT-YR GROSS-AREA	284.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1549EC04.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY  
BUILDING 2-1549HISTORIC RED BRICK BLDG AREA  
ECO 4

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 8:51:34 PDL RUN 1  
INFRA-RED RADIANT HEAT  
WEATHER FILE- RALEIGH, NC

**ENERGY TYPE**  
**IN SITE MBTU - ELECTRICITY      NATURAL-GAS**

**CATEGORY OF USE**

SPACE HEAT	63.39	2110.89
SPACE COOL	0.00	0.00
HVAC AUX	38.09	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.48	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	94.60	0.00
<hr/>		
<b>TOTAL</b>	<b>857.56</b>	<b>2110.89</b>

TOTAL SITE ENERGY	2968.49 MBTU	129.1 KBTU/SQFT-YR GROSS-AREA	129.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	4686.25 MBTU	203.7 KBTU/SQFT-YR GROSS-AREA	203.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.7

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

13-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1549 ECO-4 Date: 03-Jan-95  
Description: INFRARED HEATING  
Project: LIMITED EEAP(RDBRKBid Date:  
Location: FORT BRAGG, N.C. Job #: 94013.05  
Sq. footage: 30000 City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0913100200	115V, 20 AMP INFRARED HTG SYS POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES				1000.00	L.F.	
Unit values	0.15	2.15	2.98	0.00	0.00		5.13
Totals	149.00	\$2,148	\$2,978	\$0	\$0		\$5,126
A09 ELECTRICAL	149	\$2,148	\$2,978	\$0	\$0		\$5,126

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0205541750	PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK						
Unit values	0.10	0.00	1.73	2.50	0.00	6.00 S.Y.	
Totals	0.57	\$0	\$10	\$15	\$0	4.23	\$25
0205543200	SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, UP TO 4" DIAMETER					1000.00 L.F.	
Unit values	0.15	0.00	2.61	1.06	0.00	3.68	
Totals	150.00	\$0	\$2,613	\$1,064	\$0	\$3,677	
0208400600	REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE					100.00 L.F.	
Unit values	0.07	0.00	1.63	0.20	0.00	1.83	
Totals	7.10	\$0	\$163	\$20	\$0	\$183	
0208401000	REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE					25.00 Ea.	
Unit values	0.20	0.00	4.60	0.56	0.00	5.16	
Totals	5.00	\$0	\$115	\$14	\$0	\$129	
0222541900	TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD					6.00 C.Y.	
Unit values	0.09	0.00	1.44	0.55	0.00	1.99	
Totals	0.53	\$0	\$9	\$3	\$0	\$12	
0222582800	TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D					6.00 L.F.	
Unit values	0.01	0.00	0.20	0.20	0.00	0.39	
Totals	0.06	\$0	\$1	\$1	\$0	\$2	
0251040380	ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 2" THICK					6.00 S.Y.	
Unit values	0.02	2.96	0.27	0.25	0.00	3.48	
Totals	0.09	\$18	\$2	\$1	\$0	\$21	
0260120200	BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK					6.00 C.Y.	
Unit values	0.16	3.79	2.79	1.13	0.00	7.71	
Totals	0.96	\$23	\$17	\$7	\$0	\$47	
0260120500	BEDDING, PLACING IN TRENCH					6.00 C.Y.	
Unit values	0.09	0.00	1.44	0.55	0.00	1.99	
Totals	0.53	\$0	\$9	\$3	\$0	\$12	
0266907800	CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER						

13-Jan-95

MeansData for Lotus

Page 3

Unit values	1.56	404.00	29.36	4.89	1.00 Ea.	
Totals	1.56	\$404	\$29	\$5	0.00	438.25

0268520150	GAS SERVICE & DISTRIB PIPING, POLYETHYLENE, 60-					
	PSI 1-1/4 "DIAM SDR 10, COIL				55.00 L.F.	
Unit values	0.06	0.63	1.10	0.00	0.00	1.72
Totals	3.30	\$34	\$60	\$0	\$0	\$94

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITEWORK		170	\$479	\$3,028	\$1,133	\$0	\$4,640
1517010650	BLACK STEEL PIPE, SCHEDULE 40, THREADED, 4" DIAM W/CPLGS & HNGRS 10'OC					800.00	L.F.
Unit values	0.44	13.49	6.84	0.00	0.00		20.32
Totals	355.20	\$10,789	\$5,469	\$0	\$0		\$16,258
1517011320	PIPE STEEL GALV SCH 40 THRD W/CPLG & HNDR SZD FOR CVRG 10'OC 3/4" DIAM					1300.00	L.F.
Unit values	0.13	1.90	2.24	0.00	0.00		4.14
Totals	170.30	\$2,468	\$2,918	\$0	\$0		\$5,386
1519010320	ALUMINUM REFLECTORS WITH HANGERS					85.00	Ea.
Unit values	0.05	39.75	2.87	0.00	0.00		42.62
Totals	4.25	\$3,379	\$244	\$0	\$0		\$3,623
1524105040	INFRARED HTG SYS VACUUM PUMP AND VENT PIPING					4.00	Ea.
Unit values	3.00	737.61	90.75	0.00	0.00		828.36
Totals	12.00	\$2,950	\$363	\$0	\$0		\$3,313
1552301020	INFRARED HTG SYS GAS FIRED BURNER, 100 MBH, AND COMBUSTION CHAMBER					24.00	Ea.
Unit values	1.00	859.14	33.28	0.00	0.00		892.42
Totals	24.00	\$20,619	\$799	\$0	\$0		\$21,418
1562600135	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 3/4" PIPE SIZE FOR ROOFTP HVAC UN					2.00	Ea.
Unit values	0.40	54.95	6.84	0.00	0.00		61.78
Totals	0.80	\$110	\$14	\$0	\$0		\$124
1562600137	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 1-1/4" PIPE SIZE , FOR BLDG GAS S					1.00	Ea.
Unit values	0.53	225.77	9.14	0.00	0.00		234.91
Totals	0.53	\$226	\$9	\$0	\$0		\$235
U15 MECHANICAL		568	\$40,541	\$9,816	\$0	\$0	\$50,357

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1631200100	INFRARED HEATING SYS POWER / CONTROL PANEL					
Unit values	2.96	320.72	45.97	0.00	4.00 Ea.	366.69
Totals	11.85	\$1,283	\$184	\$0	\$0	\$1,467
U16 ELECTRICAL	12	\$1,283	\$184	\$0	\$0	\$1,467

13-Jan-95

MeansData for Lotus

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Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		899	\$44,451	\$16,006	\$1,133	\$0	\$61,590
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	0.00%			\$0			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	0.00%					\$0	
TOTAL BEFORE CONTINGENC			\$44,451	\$16,006	\$1,133	\$0	\$61,590
CONTINGENCY	20.00%						\$12,318
BOND	0.00%						\$0
PROFIT	10.00%						\$6,159
JOB TOTAL							\$80,067

=====
Estimate: BLDG 1549 ECO-4 Date: 03-Jan-95
Description: INFRARED HEATING
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
A09 ELECTRICAL	149	\$2,148	\$2,978	\$0	\$0	\$5,126
U02 SITEWORK	170	\$479	\$3,028	\$1,133	\$0	\$4,640
U15 MECHANICAL	568	\$40,541	\$9,816	\$0	\$0	\$50,357
U16 ELECTRICAL	12	\$1,283	\$184	\$0	\$0	\$1,467
<b>TOTAL</b>	<b>899</b>	<b>\$44,451</b>	<b>\$16,006</b>	<b>\$1,133</b>	<b>\$0</b>	<b>\$61,590</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	0.00%		\$0			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	0.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$44,451</b>	<b>\$16,006</b>	<b>\$1,133</b>		<b>\$0</b>	<b>\$61,590</b>
CONTINGENCY	20.00%					\$12,318
BOND	0.00%					\$0
PROFIT	10.00%					\$6,159
<b>JOB TOTAL</b>						<b>\$80,067</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 31659.
B. SIOH	\$ 1256.
C. DESIGN COST	\$ 1256.
D. TOTAL COST (1A+1B+1C)	\$ 34171.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 34171.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	889.	\$ 17060.	18.57	\$ 316801.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-821.	\$ -11043.	18.58	\$ -205179.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		68.	\$ 6017.		\$ 111623.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 500.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL TANK	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE)) \$ 7017.

5. SIMPLE PAYBACK PERIOD (1G/4) 4.87 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 127163.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 3.72  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 9.99 %

FT BRAGG ENERGY STUDY

BUILDING 2-1728

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 6/1995

14:42:13 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

1728.SIM

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	133.98	3035.71
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
-----		
TOTAL	5363.14	3035.71

TOTAL SITE ENERGY 8398.77 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 19140.97 MBTU 255.8 KBTU/SQFT-YR GROSS-AREA 255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1728ECO4.SIM

1/10/95

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FT BRAGG ENERGY STUDY  
 BUILDING 2-1728  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
 ECO-4

DOE-2.1C 1/10/1995 16:27:44 PDL RUN 1  
 NEW NG BOILER  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	133.98	2802.20
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
<hr/>		
TOTAL	5363.14	2802.20

TOTAL SITE ENERGY 8165.25 MBTU 109.1 KBTU/SQFT-YR GROSS-AREA 109.1 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 18907.46 MBTU 252.7 KBTU/SQFT-YR GROSS-AREA 252.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

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=====  
Estimate: BLDG 1728 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551153360	HTG BR GAS CI STD HTWR GOP 2856 MBH						
Unit values	96.97	17682.30	1588.13	0.00	1.00 Ea.	0.00	19270.43
Totals	96.97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270

12-Jan-95

MeansData for Lotus

Page 2

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Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$349			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$17,682		\$1,937		\$0	\$19,619
CONTINGENCY	15.00%						\$2,943
BOND	3.00%						\$589
PROFIT	10.00%						\$1,962
JOB TOTAL							\$25,113

12-Jan-95

MeansData for Lotus

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 Estimate: BLDG 1728 ECO-4 Date: 22-Dec-94
 Description: INSTALL NATURAL GAS BOILER
 Project: ECIP / FEMP Bid Date:
 Location: FORT BRAGG NC Job #: 94013.05
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
TOTAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$349			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$17,682	\$1,937	\$0	\$0	\$19,619
CONTINGENCY	15.00%					\$2,943
BOND	3.00%					\$589
PROFIT	10.00%					\$1,962
JOB TOTAL						\$25,113

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 4 REPLACE OIL HEAT WITH NATURAL GAS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO4  
 LCCID FY95 (92)

**1. INVESTMENT**

A. CONSTRUCTION COST	\$ 31659.
B. SIOH	\$ 1256.
C. DESIGN COST	\$ 1256.
D. TOTAL COST (1A+1B+1C)	\$ 34171.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 34171.

**2. ENERGY SAVINGS (+) / COST (-)**

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	-3.	\$ -94.	15.08	\$ -1423.
B. DIST	\$ 19.18	582.	\$ 11167.	18.57	\$ 207364.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	-526.	\$ -7073.	18.58	\$ -131410.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.		
N. TOTAL		54.	\$ 4000.	14.88	\$ 0.
					\$ 74530.

**3. NON ENERGY SAVINGS (+) / COST (-)**

**A. ANNUAL RECURRING (+/-)**

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 500.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 7440.

**B. NON RECURRING SAVINGS (+) / COSTS (-)**

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUEL OIL	\$ 10000.	7	.81	\$ 8100.
d. TOTAL	\$ 10000.			\$ 8100.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 15540.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 5000.

5. SIMPLE PAYBACK PERIOD (1G/4) 6.83 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 90070.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.64  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 8.11 %

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

1731A.SIM

BUILDING 2-1731 PART A (FIRST SECTION) BASE CASE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 6/1995

15:17: 2 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
-----		
TOTAL	1965.15	764.80

TOTAL SITE ENERGY	2729.95 MBTU	123.9 KBTU/SQFT-YR GROSS-AREA	123.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6666.15 MBTU	302.5 KBTU/SQFT-YR GROSS-AREA	302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

1731B.SIM

BUILDING 2-1731 PART B (SECOND SECTION) BASE CASE

DOE-2.1C 1/ 6/1995

15:36:40 PDL RUN 1

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

PRESENT ENERGY USAGE

WEATHER FILE- RALEIGH, NC

ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
-----		
TOTAL	1911.12	601.04

TOTAL SITE ENERGY	2512.19 MBTU	109.8 KBTU/SQFT-YR GROSS-AREA	109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6340.23 MBTU	277.0 KBTU/SQFT-YR GROSS-AREA	277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA  
BUILDING 2-1731 PART C (THIRD SECTION) BASE CASE  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1731C.SIM  
DOE-2.1C 1/ 6/1995 15:58:56 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	32.17	621.20
SPACE COOL	601.67	0.00
HVAC AUX	402.21	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
-----		
TOTAL	1911.79	621.20

TOTAL SITE ENERGY 2532.99 MBTU 110.7 KBTU/SQFT-YR GROSS-AREA 110.7 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6362.32 MBTU 278.0 KBTU/SQFT-YR GROSS-AREA 278.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1731AEC4.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

BUILDING 2-1731 PART A (FIRST SECTION) ECO-4

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 14:43:49 PDL RUN 1

NEW NG BOILER

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	40.00	705.97
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1965.15	705.97

TOTAL SITE ENERGY	2671.12 MBTU	121.2 KBTU/SQFT-YR GROSS-AREA	121.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6607.32 MBTU	299.8 KBTU/SQFT-YR GROSS-AREA	299.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1731BEC4.SIM

1/10/95

Page 1

HISTORIC RED BRICK BLDG AREA

FT BRAGG ENERGY STUDY  
 BUILDING 2-1731 PART B (SECOND SECTION) ECO-4  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 14:58:28 PDL RUN 1  
 NEW NG BOILER  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	31.12	554.80
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
<hr/>		
TOTAL	1911.12	554.80

TOTAL SITE ENERGY 2465.95 MBTU 107.7 KBTU/SQFT-YR GROSS-AREA 107.7 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6294.00 MBTU 275.0 KBTU/SQFT-YR GROSS-AREA 275.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

BUILDING 2-1731 PART C (THIRD SECTION) ECO-4

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995

15: 9:53 PDL RUN 1

NEW NG BOILER

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY NATURAL-GAS

## CATEGORY OF USE

SPACE HEAT	29.95	533.97
SPACE COOL	601.67	0.00
HVAC AUX	413.62	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
	-----	-----
TOTAL	1920.99	533.97

TOTAL SITE ENERGY 2454.97 MBTU 107.3 KBTU/SQFT-YR GROSS-AREA 107.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6302.72 MBTU 275.4 KBTU/SQFT-YR GROSS-AREA 275.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1731 ECO-4 Date: 22-Dec-94  
Description: INSTALL NATURAL GAS BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551153360	HTG BR GAS CI STD HTWR GOP 2856 MBH						
Unit values	96.97	17682.30	1588.13	0.00	1.00 Ea.	0.00	19270.43
Totals	96.97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$0	\$19,270

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$349			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$17,682		\$1,937		\$0	\$19,619
CONTINGENCY	15.00%						\$2,943
BOND	3.00%						\$589
PROFIT	10.00%						\$1,962
JOB TOTAL							\$25,113

12-Jan-95

MeansData for Lotus

Page 3

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 Estimate: BLDG 1731 ECO-4 Date: 22-Dec-94  
 Description: INSTALL NATURAL GAS BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
TOTAL	97	\$17,682	\$1,588	\$0	\$0	\$19,270
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$349			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$17,682	\$1,937	\$0	\$0	\$19,619
CONTINGENCY	15.00%					\$2,943
BOND	3.00%					\$589
PROFIT	10.00%					\$1,962
JOB TOTAL						\$25,113

## 10 ECO - 5 CALCULATIONS

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-5:  
Install New Oil Heating Systems.

A single life-cycle cost analysis and cost estimate was performed for each building.

## 10 ECO - 5 CALCULATIONS

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

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1-1333 .....	10-15
2-1120 .....	10-21
2-1127 .....	10-27
2-1133 .....	10-33
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2-1549 .....	10-49
2-1728 .....	10-59
2-1731 .....	10-65

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO5  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 30251.
B. SIOH	\$ 1513.
C. DESIGN COST	\$ 1513.
D. TOTAL COST (1A+1B+1C)	\$ 33277.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 33277.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	30.	\$ 574.	18.57	\$ 10664.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		30.	\$ 574.		\$ 10664.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)				\$ 500.
(1) DISCOUNT FACTOR (TABLE A)				14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 7440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 1074.

5. SIMPLE PAYBACK PERIOD (1G/4) 30.98 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 18104.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = .54  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : N/A

1/10/95

Page 1

GL ENERGY STUDY

LU 1242

BEPs ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 9/1995

PRESENT ENERGY USAGE

WEATHER FILE-

14: 2: 8 PDL RUN 1

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
	-----	-----
TOTAL	1613.84	1328.59

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1242EC05.SIM 1/10/95 Page 1  
FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 1/10/1995 15:48:21 PDL RUN 1  
BUILDING 1242 ECO 5 NEW FUEL OIL BOILER  
RE-BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	68.66	1226.39
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
-----		
TOTAL	1613.84	1226.39

TOTAL SITE ENERGY 2946.49 MBTU 153.1 KBTU/SQFT-YR GROSS-AREA 153.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6391.86 MBTU 332.2 KBTU/SQFT-YR GROSS-AREA 332.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1242 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207280	HTG BLR OIL STL JCK&BRN HTW 2310MBH						1.00 Ea.
Unit values	100.00	21678.30	1603.25	0.00	0.00	0.00	23281.55
Totals	100.00	\$21,678	\$1,603	\$0	\$0	\$0	\$23,281
U15 MECHANICAL	100	\$21,678	\$1,603	\$0	\$0	\$0	\$23,281

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	100	\$21,678	\$1,603	\$0	\$0	\$23,281
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$353			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$21,678	\$1,956	\$0	\$0	\$23,634
CONTINGENCY	15.00%					\$3,545
BOND	3.00%					\$709
PROFIT	10.00%					\$2,363
JOB TOTAL						\$30,251

=====  
 Estimate: BLDG 1242 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER

Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC  
 =====

SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	100	\$21,678	\$1,603	\$0	\$0	\$23,281
TOTAL	100	\$21,678	\$1,603	\$0	\$0	\$23,281
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$353			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$21,678		\$1,956	\$0	\$0	\$23,634
CONTINGENCY	15.00%					\$3,545
BOND	3.00%					\$709
PROFIT	10.00%					\$2,363
JOB TOTAL						\$30,251

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO5  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 38045.
B. SIOH	\$ 1902.
C. DESIGN COST	\$ 1902.
D. TOTAL COST (1A+1B+1C)	\$ 41849.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 41849.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	114.	\$ 2193.	18.57	\$ 40718.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		114.	\$ 2193.		\$ 40718.

3. NON ENERGY SAVINGS (+) / COST(-)

A. ANNUAL RECURRING (+/-)				\$ 500.
(1) DISCOUNT FACTOR (TABLE A)			14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)

d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 7440.
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4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 2693.

5. SIMPLE PAYBACK PERIOD (1G/4) 15.54 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 48158.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.15  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 3.73 %

FT BRAGG ENERGY STUDY  
BUILDING 1-1326 HQ BLDG  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 14:16:42 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	285.53	5085.34
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
	-----	-----
TOTAL	6248.75	5085.34

TOTAL SITE ENERGY	11333.96 MBTU	192.0 KBTU/SQFT-YR GROSS-AREA	192.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	23849.96 MBTU	404.0 KBTU/SQFT-YR GROSS-AREA	404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1326EC05.SIM 1/10/95 Page 1  
FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 1/10/1995 17:28:53 PDL RUN 1  
BUILDING 1-1326 HQ BLDG ECO 5 NEW FUEL OIL BOILER  
SPT- REPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

**CATEGORY OF USE**

SPACE HEAT	285.53	4694.16
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
	-----	-----
TOTAL	6248.75	4694.16

TOTAL SITE ENERGY	10942.78 MBTU	185.4 KBTU/SQFT-YR	GROSS-AREA	185.4 KBTU/SQFT-YR	NET-AREA
TOTAL SOURCE ENERGY	23458.78 MBTU	397.4 KBTU/SQFT-YR	GROSS-AREA	397.4 KBTU/SQFT-YR	NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1326 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207300	HTG BLR OIL STL JCK&BRN HTW 2835MBH						1.00 Ea.
Unit values	141.00	26973.00	2253.63	0.00	0.00	0.00	29226.63
Totals	141.00	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		141	\$26,973	\$2,254		\$0	\$0 \$29,227
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$496			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$26,973		\$2,750		\$0	\$0 \$29,723
CONTINGENCY	15.00%						\$4,458
BOND	3.00%						\$892
PROFIT	10.00%						\$2,972
JOB TOTAL							\$38,045

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Estimate: BLDG 1326 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECOS  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 15740.
B. SIOH	\$ 787.
C. DESIGN COST	\$ 787.
D. TOTAL COST (1A+1B+1C)	\$ 17314.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 17314.

2. ENERGY SAVINGS (+) / COST (-)

FUEL	UNIT COST \$/ MWH(1)	DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS		OCT 1994	DISCOUNTED SAVINGS (5)
		SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	20.	\$ 385.	18.57	\$ 7156.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		20.	\$ 385.		\$ 7156.

3. NON ENERGY SAVINGS (+) / COST(-)

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)

d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4)	\$ 7440.
--	----------

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 885.

5. SIMPLE PAYBACK PERIOD (1G/4) 19.56 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 14596.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .84  
(IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

FT BRAGG ENERGY STUDY

BUILDING 1-1333

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/3/1995

15:32: 6 PDL RUN 1

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

## ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	79.52	891.42
SPACE COOL	347.65	0.00
HVAC AUX	192.92	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
	-----	-----
TOTAL	1247.85	891.42

TOTAL SITE ENERGY	2139.24 MBTU	162.3 KBTU/SQFT-YR GROSS-AREA	162.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	4638.62 MBTU	351.9 KBTU/SQFT-YR GROSS-AREA	351.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1333EC05.SIM

1/10/95

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FT BRAGG ENERGY STUDY  
BUILDING 1-1333HISTORIC RED BRICK BLDG AREA  
ECO 5DOE-2.1C 1/10/1995 15:59:46 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	79.52	822.85
SPACE COOL	347.65	0.00
HVAC AUX	192.92	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
	-----	-----
TOTAL	1247.85	822.85

TOTAL SITE ENERGY	2070.67 MBTU	157.1 KBTU/SQFT-YR GROSS-AREA	157.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	4570.05 MBTU	346.7 KBTU/SQFT-YR GROSS-AREA	346.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1333 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207220	HTG BLR OIL STL JCK&BRN HTW 1050MBH						1.00 Ea.
Unit values	57.14	11188.80	907.50	0.00	0.00	0.00	12096.30
Totals	57.14	\$11,189	\$908	\$0	\$0	\$0	\$12,097
U15 MECHANICAL		58	\$11,189	\$908	\$0	\$0	\$12,097

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	58	\$11,189	\$908	\$0	\$0	\$12,097
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$200			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$11,189	\$1,108	\$0	\$0	\$0	\$12,297
CONTINGENCY	15.00%					\$1,845
BOND	3.00%					\$369
PROFIT	10.00%					\$1,230
JOB TOTAL						\$15,740

12-Jan-95

MeansData for Lotus

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 Estimate: BLDG 1333 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	58	\$11,189	\$908	\$0	\$0	\$12,097
TOTAL	58	\$11,189	\$908	\$0	\$0	\$12,097
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$200			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$11,189	\$1,108	\$0	\$0	\$0	\$12,297
CONTINGENCY	15.00%					\$1,845
BOND	3.00%					\$369
PROFIT	10.00%					\$1,230
JOB TOTAL						\$15,740

LIFE CYCLE COST ANALYSIS SUMM

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)

INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3

PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS

FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120

ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 38045.
B. SIOH	\$ 1902.
C. DESIGN COST	\$ 1902.
D. TOTAL COST (1A+1B+1C)	\$ 41849.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 41849.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	107.	\$ 2047.	18.57	\$ 38018.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		107.	\$ 2047.		\$ 38018.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)				\$ 500.
(1) DISCOUNT FACTOR (TABLE A)			14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-) (4)

d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-) (3A2+3Bd4)	\$ 7440.
--	----------

4. FIRST YEAR DOLLAR SAVINGS  $2N3+3A+(3Bd1/(YRS\ ECONOMIC\ LIFE))$  \$ 2547.

5. SIMPLE PAYBACK PERIOD (1G/4) 16.43 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 45458.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.09  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 3.43 %

FT BRAGG ENERGY STUDY  
BUILDING 2-1120  
REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 9:26: 7 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
	-----	-----
TOTAL	3885.73	4735.99

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1120ECOS.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY  
BUILDING 2-1120HISTORIC RED BRICK BLDG AREA  
ECO 5

RT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 15: 5:45 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	181.42	4371.68
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
<hr/>		
TOTAL	3885.73	4371.68

TOTAL SITE ENERGY      8257.25 MBTU      111.3 KBTU/SQFT-YR GROSS-AREA      111.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    16040.07 MBTU      216.2 KBTU/SQFT-YR GROSS-AREA      216.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1120 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207300	HTG BLR OIL STL JCK&BRN HTW 2835MBH						1.00 Ea.
Unit values	141.00	26973.00	2253.63	0.00	0.00	0.00	29226.63
Totals	141.00	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	141	\$26,973	\$2,254		\$0	\$0 \$29,227
SALES TAX	0.00%		\$0			
MATL MARKUP	0.00%		\$0			
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750		\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

12-Jan-95

MeansData for Lotus

Page 3

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 Estimate: BLDG 1120 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 STUDY: ECO5  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 43351.
B. SIOH	\$ 2168.
C. DESIGN COST	\$ 2168.
D. TOTAL COST (1A+1B+1C)	\$ 47687.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 47687.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	78.	\$ 1495.	18.57	\$ 27753.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		78.	\$ 1495.		\$ 27753.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
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d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 7440.
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4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 1995.

5. SIMPLE PAYBACK PERIOD (1G/4) 23.91 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 35193.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .74  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 1.45 %

1127.SIM 12 28 '94 Page 1  
FT BRAGG ENERGY STUDY HISTORIC RED BRICK BUILDING AREA DOE-2.1C 12/22/1994 8:24:33 PDL RUN 1  
BUILDING 2-1127 BASE CASE PRESENT ENERGY USAGE  
APT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	178.99	3457.19
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
-----		
TOTAL	4799.69	3457.19

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1127EC05.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1127  
REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

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HISTORIC RED BRICK BUILDING AREA  
ECO 5  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 17: 2:40 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	178.99	3191.26
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
	-----	-----
TOTAL	4799.69	3191.26

TOTAL SITE ENERGY 7990.93 MBTU 138.3 KBTU/SQFT-YR GROSS-AREA 138.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 17604.71 MBTU 304.6 KBTU/SQFT-YR GROSS-AREA 304.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 11207 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207320	HTG BLR OIL STL JCK&BRN HTW 3150MBH						1.00 Ea.
Unit values	184.00	30269.70	2949.38	0.00	0.00	0.00	33219.08
Totals	184.00	\$30,270	\$2,949	\$0	\$0	\$0	\$33,219
U15 MECHANICAL	184	\$30,270	\$2,949	\$0	\$0	\$0	\$33,219

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	184	\$30,270	\$2,949	\$0	\$0	\$33,219
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$649			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$30,270	\$3,598	\$0	\$0	\$0	\$33,868
CONTINGENCY	15.00%					\$5,080
BOND	3.00%					\$1,016
PROFIT	10.00%					\$3,387
JOB TOTAL						\$43,351

=====
 Estimate: BLDG 11297 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	184	\$30,270	\$2,949	\$0	\$0	\$33,219
TOTAL	184	\$30,270	\$2,949	\$0	\$0	\$33,219
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$649			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$30,270	\$3,598	\$0	\$0	\$33,868
CONTINGENCY	15.00%					\$5,080
BOND	3.00%					\$1,016
PROFIT	10.00%					\$3,387
JOB TOTAL						\$43,351

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1133  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: EC05  
 LCCID FY95 (92)

**1. INVESTMENT**

A. CONSTRUCTION COST	\$ 38045.
B. SIOH	\$ 1902.
C. DESIGN COST	\$ 1902.
D. TOTAL COST (1A+1B+1C)	\$ 41849.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 41849.

**2. ENERGY SAVINGS (+) / COST (-)**

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	32.	\$ 614.	18.57	\$ 11401.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		32.	\$ 614.		\$ 11401.

**3. NON ENERGY SAVINGS (+) / COST (-)**

A. ANNUAL RECURRING (+/-)				\$ 500.
(1) DISCOUNT FACTOR (TABLE A)			14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-)	YR OC (1)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 7440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 1114.

5. SIMPLE PAYBACK PERIOD (1G/4) 37.57 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 18841.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .45  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

1133.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1133  
REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

12 28 94

Page 1  
HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 12/22/1994 13:29:34 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE - RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	425.53	1420.44
SPACE COOL	947.02	0.00
HVAC AUX	103.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1011.38	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	379.22	0.00
	-----	-----
TOTAL	2866.64	1420.44

TOTAL SITE ENERGY 4286.99 MBTU 115.9 KBTU/SQFT-YR GROSS-AREA 115.9 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 10028.71 MBTU 271.2 KBTU/SQFT-YR GROSS-AREA 271.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1133EC05.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1133

1/10/95

Page 1  
HISTORIC RED BRICK BLDG AREA  
ECO 5  
BT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 15:22:14 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	425.53	1311.18
SPACE COOL	947.02	0.00
HVAC AUX	103.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1011.38	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	379.22	0.00
	-----	-----
TOTAL	2866.64	1311.18

TOTAL SITE ENERGY 4177.73 MBTU 113.0 KBTU/SQFT-YR GROSS-AREA 113.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 9919.44 MBTU 268.3 KBTU/SQFT-YR GROSS-AREA 268.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

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Estimate: BLDG 1133 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line # Description

		Manhours	Matl	Labor	Equipment	Sub	Total
1551207300	HTG BLR OIL STL JCK&BRN HTW 2835MBH						1.00 Ea.
Unit values	141.00	26973.00	2253.63	0.00	0.00	0.00	29226.63
Totals	141.00	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

=====
 Estimate: BLDG 1133 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 STUDY: ECO5  
 LCCID FY95 (92)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 30251.
B. SIOH	\$ 1513.
C. DESIGN COST	\$ 1513.
D. TOTAL COST (1A+1B+1C)	\$ 33277.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 33277.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	86.	\$ 1655.	18.57	\$ 30731.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		86.	\$ 1655.		\$ 30731.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)				\$ 500.
(1) DISCOUNT FACTOR (TABLE A)			14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 7440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 2155.

5. SIMPLE PAYBACK PERIOD (1G/4) 15.44 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 38171.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.15  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 3.71 %

FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART A (FIRST FLOOR)

DOE-2.1C 12/28/1994  
PRESENT ENERGY USAGE

10:15:52 PDL RUN 1  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	398.05	1053.81
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1907.21	1053.81

TOTAL SITE ENERGY	2961.09 MBTU	91.3 KBTU/SQFT-YR GROSS-AREA	91.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6781.38 MBTU	209.1 KBTU/SQFT-YR GROSS-AREA	209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138B.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REF-T- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

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HISTORIC RED BRICK BLDG AREA  
BASE CASE PART B (SECOND FLOOR)

DOE-2.1C 1/ 9/1995 14:13:37 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	40.62	873.22
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
	-----	-----
TOTAL	2263.21	873.22

TOTAL SITE ENERGY 3136.42 MBTU 165.3 KBTU/SQFT-YR GROSS-AREA 165.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 7669.62 MBTU 404.1 KBTU/SQFT-YR GROSS-AREA 404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

T BRAGG ENERGY STUDY  
BUILDING 1-1138

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART C (THIRD FLOOR)

ST-BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 9/1995 14:58:48 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	63.02	1901.29
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.34	0.00
	-----	-----
<b>TOTAL</b>	<b>2174.70</b>	<b>1901.29</b>

TOTAL SITE ENERGY	4076.03 MBTU	214.8 KBTU/SQFT-YR GROSS-AREA	214.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	8432.04 MBTU	444.3 KBTU/SQFT-YR GROSS-AREA	444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138AEC5.SIM

1/10/95

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FT BRAGG ENERGY STUDY  
BUILDING 1-1138HISTORIC RED BRICK BLDG AREA  
ECO 5 PART A (FIRST FLOOR)

RT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 15:29:52 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	398.05	972.75
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1907.21	972.75

TOTAL SITE ENERGY      2880.03 MBTU      88.8 KBTU/SQFT-YR GROSS-AREA      88.8 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY      6700.31 MBTU      206.6 KBTU/SQFT-YR GROSS-AREA      206.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

11388EC5.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY

BUILDING 1-1138

PORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO 5 PART B (SECOND FLOOR)

DOE-2.1C 1/10/1995

15:40:16 PDL RUN 1

NEW FUEL OIL BOILER

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.62	806.05
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
	-----	-----
TOTAL	2263.21	806.05

TOTAL SITE ENERGY	3069.25 MBTU	161.7 KBTU/SQFT-YR GROSS-AREA	161.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	7602.45 MBTU	400.6 KBTU/SQFT-YR GROSS-AREA	400.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138CEC5.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/10/95

Page 1  
HISTORIC RED BRICK BLDG AREA  
ECO 5 PART C (THIRD FLOOR)

DOE-2.1C 1/10/1995 15:38:56 PDL RUN 1  
NEW FUEL OIL BOILER  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	63.02	1755.04
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.34	0.00
	-----	-----
TOTAL	2174.70	1755.04

TOTAL SITE ENERGY 3929.78 MBTU 207.1 KBTU/SQFT-YR GROSS-AREA 207.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 8285.79 MBTU 436.6 KBTU/SQFT-YR GROSS-AREA 436.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

=====  
Estimate: BLDG 1138 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207280	HTG BLR OIL STL JCK&BRN HTW 2310MBH					1.00 Ea.	
Unit values	100.00	21678.30	1603.25	0.00	0.00	0.00	23281.55
Totals	100.00	\$21,678	\$1,603	\$0	\$0	\$0	\$23,281
U15 MECHANICAL	100	\$21,678	\$1,603	\$0	\$0	\$0	\$23,281

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	100	\$21,678	\$1,603		\$0	\$0 \$23,281
SALES TAX	0.00%		\$0			
MATL MARKUP	0.00%		\$0			
LABOR MARKUP	22.00%			\$353		
EQUIPT MARKUP	0.00%				\$0	
SUB MARKUP	5.00%					\$0
TOTAL BEFORE CONTINGENC		\$21,678	\$1,956		\$0	\$23,634
CONTINGENCY	15.00%					\$3,545
BOND	3.00%					\$709
PROFIT	10.00%					\$2,363
JOB TOTAL						\$30,251

=====
 Estimate: BLDG 1138 ECO-5 Date: 22-Dec-94  
 Description: INSTALL OIL BOILER  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	100	\$21,678	\$1,603	\$0	\$0	\$23,281
TOTAL	100	\$21,678	\$1,603	\$0	\$0	\$23,281
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$353			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$21,678	\$1,956	\$0	\$0	\$23,634
CONTINGENCY	15.00%					\$3,545
BOND	3.00%					\$709
PROFIT	10.00%					\$2,363
JOB TOTAL						\$30,251

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL -  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 80067.
B. SIOH	\$ 4003.
C. DESIGN COST	\$ 4003.
D. TOTAL COST (1A+1B+1C)	\$ 88073.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 88073.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	16.	\$ 545.	15.08	\$ 8217.
B. DIST	\$ 19.18	497.	\$ 9523.	18.57	\$ 176850.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		512.	\$ 10068.		\$ 185067.

3. NON ENERGY SAVINGS (+) / COST(-)

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
------	--------------------------------	-----------------	------------------------	---

d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 7440.
--	----------

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 10568.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.33 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 192507.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 2.19  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 7.11 %

1549.SIM 12 28, 94 Page 1  
 FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 12 22 1994 14: 3:29 PDL RUN 1  
 BUILDING 2-1549 BASE CASE PRESENT ENERGY USAGE WEATHER FILE- RALEIGH, NC  
 BT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

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ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	102.49	3805.53
SPACE COOL	0.00	0.00
HVAC AUX	52.17	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	94.60	0.00
	-----	-----
TOTAL	910.77	3805.53

TOTAL SITE ENERGY 4716.32 MBTU 205.1 KBTU/SQFT-YR GROSS-AREA 205.1 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6540.62 MBTU 284.4 KBTU/SQFT-YR GROSS-AREA 284.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1549EC05.SIM

1/10/95

Page 1

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995 10:43:42 PDL RUN 1

ECO- 5

FUEL OIL : INFRA-RED RADIANT HEAT

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	63.39	1948.51
SPACE COOL	0.00	0.00
HVAC AUX	38.09	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.48	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	94.60	0.00
	-----	-----
TOTAL	857.56	1948.51

TOTAL SITE ENERGY	2806.11 MBTU	122.0 KBTU/SQFT-YR GROSS-AREA	122.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	4523.87 MBTU	196.7 KBTU/SQFT-YR GROSS-AREA	196.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.7

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====  
Estimate: BLDG 1549 ECO-~~45~~ Date: 03-Jan-95  
Description: INFRARED HEATING  
Project: LIMITED EEAP(RDBRKBD) Date:  
Location: FORT BRAGG, N.C. Job #: 94013.05  
Sq. footage: 30000 City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0913100200	115V, 20 AMP INFRARED HTG SYS POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES					1000.00	L.F.
Unit values	0.15	2.15	2.98	0.00	0.00		5.13
Totals	149.00	\$2,148	\$2,978	\$0	\$0		\$5,126
A09 ELECTRICAL	149	\$2,148	\$2,978	\$0	\$0		\$5,126

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0205541750	PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK						6.00 S.Y.
Unit values	0.10	0.00	1.73	2.50	0.00		4.23
Totals	0.57	\$0	\$10	\$15	\$0		\$25
0205543200	SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, UP TO 4 "DIAMETER					1000.00	L.F.
Unit values	0.15	0.00	2.61	1.06	0.00		3.68
Totals	150.00	\$0	\$2,613	\$1,064	\$0		\$3,677
0208400600	REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE					100.00	L.F.
Unit values	0.07	0.00	1.63	0.20	0.00		1.83
Totals	7.10	\$0	\$163	\$20	\$0		\$183
0208401000	REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE					25.00	Ea.
Unit values	0.20	0.00	4.60	0.56	0.00		5.16
Totals	5.00	\$0	\$115	\$14	\$0		\$129
0222541900	TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD					6.00	C.Y.
Unit values	0.09	0.00	1.44	0.55	0.00		1.99
Totals	0.53	\$0	\$9	\$3	\$0		\$12
0222582800	TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D					6.00	L.F.
Unit values	0.01	0.00	0.20	0.20	0.00		0.39
Totals	0.06	\$0	\$1	\$1	\$0		\$2
0251040380	ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING COURSE, 2" THICK					6.00	S.Y.
Unit values	0.02	2.96	0.27	0.25	0.00		3.48
Totals	0.09	\$18	\$2	\$1	\$0		\$21
0260120200	BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR BANK					6.00	C.Y.
Unit values	0.16	3.79	2.79	1.13	0.00		7.71
Totals	0.96	\$23	\$17	\$7	\$0		\$47
0260120500	BEDDING, PLACING IN TRENCH					6.00	C.Y.
Unit values	0.09	0.00	1.44	0.55	0.00		1.99
Totals	0.53	\$0	\$9	\$3	\$0		\$12
0266907800	CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER						

13-Jan-95

MeansData for Lotus

Page 3

					1.00 Ea.	
Unit values	1.56	404.00	29.36	4.89	0.00	438.25
Totals	1.56	\$404	\$29	\$5	\$0	\$438
0268520150	GAS SERVICE & DISTRIB PIPING, POLYETHYLENE, 60-					
	PSI 1-1/4"DIAM SDR 10, COIL				55.00 L.F.	
Unit values	0.06	0.63	1.10	0.00	0.00	1.72
Totals	3.30	\$34	\$60	\$0	\$0	\$94

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITEWORK		170	\$479	\$3,028	\$1,133	\$0	\$4,640
1517010650	BLACK STEEL PIPE, SCHEDULE 40, THREADED, 4" DIAM W/CPLGS & HNGRS 10'OC					800.00 L.F.	
Unit values	0.44	13.49	6.84	0.00	0.00		20.32
Totals	355.20	\$10,789	\$5,469	\$0	\$0		\$16,258
1517011320	PIPE STEEL GALV SCH 40 THRD W/CPLG & HNDR SZD FOR CVRG 10'OC 3/4" DIAM					1300.00 L.F.	
Unit values	0.13	1.90	2.24	0.00	0.00		4.14
Totals	170.30	\$2,468	\$2,918	\$0	\$0		\$5,386
1519010320	ALUMINUM REFLECTORS WITH HANGERS					85.00 Ea.	
Unit values	0.05	39.75	2.87	0.00	0.00		42.62
Totals	4.25	\$3,379	\$244	\$0	\$0		\$3,623
1524105040	INFRARED HTG SYS VACUUM PUMP AND VENT PIPING					4.00 Ea.	
Unit values	3.00	737.61	90.75	0.00	0.00		828.36
Totals	12.00	\$2,950	\$363	\$0	\$0		\$3,313
1552301020	INFRARED HTG SYS GAS FIRED BURNER, 100 MBH, AND COMBUSTION CHAMBER					24.00 Ea.	
Unit values	1.00	859.14	33.28	0.00	0.00		892.42
Totals	24.00	\$20,619	\$799	\$0	\$0		\$21,418
1562600135	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 3/4" PIPE SIZE FOR ROOFTP HVAC UN					2.00 Ea.	
Unit values	0.40	54.95	6.84	0.00	0.00		61.78
Totals	0.80	\$110	\$14	\$0	\$0		\$124
1562600137	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 1-1/4" PIPE SIZE , FOR BLDG GAS S					1.00 Ea.	
Unit values	0.53	225.77	9.14	0.00	0.00		234.91
Totals	0.53	\$226	\$9	\$0	\$0		\$235
U15 MECHANICAL		568	\$40,541	\$9,816	\$0	\$0	\$50,357

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1631200100	INFRARED HEATING SYS POWER / CONTROL PANEL					
Unit values	2.96	320.72	45.97	0.00	4.00 Ea.	366.69
Totals	11.85	\$1,283	\$184	\$0	\$0	\$1,467
U16 ELECTRICAL	12	\$1,283	\$184	\$0	\$0	\$1,467

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		899	\$44,451	\$16,006	\$1,133	\$0	\$61,590
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	0.00%			\$0			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	0.00%					\$0	
TOTAL BEFORE CONTINGENC		\$44,451	\$16,006	\$1,133	\$0	\$61,590	
CONTINGENCY	20.00%					\$12,318	
BOND	0.00%					\$0	
PROFIT	10.00%					\$6,159	
JOB TOTAL							\$80,067

=====  
 Estimate: BLDG 1549 ECO-~~15~~ Date: 03-Jan-95

Description: INFRARED HEATING

Project: LIMITED EEAP(RDBRKBid Date:

Location: FORT BRAGG, N.C. Job #: 94013.05

Sq. footage: 30000 City indx:Raleigh, NC

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SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
A09 ELECTRICAL	149	\$2,148	\$2,978	\$0	\$0	\$5,126
U02 SITWORK	170	\$479	\$3,028	\$1,133	\$0	\$4,640
U15 MECHANICAL	568	\$40,541	\$9,816	\$0	\$0	\$50,357
U16 ELECTRICAL	12	\$1,283	\$184	\$0	\$0	\$1,467
<b>TOTAL</b>	<b>899</b>	<b>\$44,451</b>	<b>\$16,006</b>	<b>\$1,133</b>	<b>\$0</b>	<b>\$61,590</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	0.00%		\$0			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	0.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$44,451</b>	<b>\$16,006</b>	<b>\$1,133</b>		<b>\$0</b>	<b>\$61,590</b>
CONTINGENCY	20.00%					\$12,318
BOND	0.00%					\$0
PROFIT	10.00%					\$6,159
<b>JOB TOTAL</b>						<b>\$80,067</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

**1. INVESTMENT**

A. CONSTRUCTION COST	\$ 38045.
B. SIOH	\$ 1902.
C. DESIGN COST	\$ 1902.
D. TOTAL COST (1A+1B+1C)	\$ 41849.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 41849.

**2. ENERGY SAVINGS (+) / COST (-)**

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	0.	\$ 0.	15.08	\$ 0.
B. DIST	\$ 19.18	68.	\$ 1312.	18.57	\$ 24369.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		68.	\$ 1312.		\$ 24369.

**3. NON ENERGY SAVINGS (+) / COST (-)**

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

**B. NON RECURRING SAVINGS (+) / COSTS (-)**

ITEM	SAVINGS (+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
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d. TOTAL	\$ 0.			0.
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C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 7440.
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**4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))** \$ 1812.

**5. SIMPLE PAYBACK PERIOD (1G/4)** 23.09 YEARS

**6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)** \$ 31809.

**7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)=** .76  
 (IF < 1 PROJECT DOES NOT QUALIFY)

**8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) :** 1.60 %

FT BRAGG ENERGY STUDY  
BUILDING 2-1728  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 14:42:13 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE		
IN SITE MBTU -	ELECTRICITY	FUEL-OIL
<b>CATEGORY OF USE</b>		
SPACE HEAT	133.98	3035.71
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
<hr/>		
<b>TOTAL</b>	<b>5363.14</b>	<b>3035.71</b>

TOTAL SITE ENERGY	8398.77 MBTU	112.3 KBTU/SQFT-YR GROSS-AREA	112.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	19140.97 MBTU	255.8 KBTU/SQFT-YR GROSS-AREA	255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1728EC05.SIM

1/10/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1728

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO 5

DOE-2.1C 1/10/1995

16: 4: 1 PDL RUN 1

NEW FUEL OIL BOILER

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	133.98	2802.20
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
	-----	-----
TOTAL	5363.14	2802.20

TOTAL SITE ENERGY    8165.25 MBTU    109.1 KBTU/SQFT-YR GROSS-AREA    109.1 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    18907.46 MBTU    252.7 KBTU/SQFT-YR GROSS-AREA    252.7 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

=====  
Estimate: BLDG 1728 ECO-5 Date: 22-Dec-94

Description: INSTALL OIL BOILER

Project: ECIP / FEMP Bid Date:

Location: FORT BRAGG NC Job #: 94013.05

Sq. footage: City indx:Raleigh, NC  
=====

Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
1551207300						
						1.00 Ea.
Unit values	141.00	26973.00	2253.63	0.00	0.00	29226.63
Totals	141.00	\$26,973	\$2,254	\$0	\$0	\$29,227
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$496			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$26,973		\$2,750		\$0	\$29,723
CONTINGENCY	15.00%						\$4,458
BOND	3.00%						\$892
PROFIT	10.00%						\$2,972
JOB TOTAL							\$38,045

=====
Estimate: BLDG 1728 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 INSTALL NEW FUEL OIL BOILERS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: EC05  
 LCCID FY95 (92)

**1. INVESTMENT**

A. CONSTRUCTION COST	\$ 38045.
B. SIOH	\$ 1902.
C. DESIGN COST	\$ 1902.
D. TOTAL COST (1A+1B+1C)	\$ 41849.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 41849.

**2. ENERGY SAVINGS (+) / COST (-)**

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	-3.	\$ -94.	15.08	\$ -1423.
B. DIST	\$ 19.18	56.	\$ 1081.	18.57	\$ 20067.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		54.	\$ 986.		\$ 18644.

**3. NON ENERGY SAVINGS (+) / COST (-)**

A. ANNUAL RECURRING (+/-)	\$ 500.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 7440.

**B. NON RECURRING SAVINGS (+) / COSTS (-)**

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+)/ COST (-) (4)
------	--------------------------------	-----------------	------------------------	--

d. TOTAL	\$ 0.			0.
----------	-------	--	--	----

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4)	\$ 7440.
--	----------

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 1486.

5. SIMPLE PAYBACK PERIOD (1G/4) 28.16 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 26084.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .62  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

FT BRAGG ENERGY STUDY                    HISTORIC RED BRICK BLDG AREA  
 BUILDING 2-1731 PART A (FIRST SECTION) BASE CASE  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 6/1995 15:17: 2 PDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY       FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1965.15	764.80

TOTAL SITE ENERGY      2729.95 MBTU      123.9 KBTU/SQFT-YR GROSS-AREA      123.9 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY     6666.15 MBTU      302.5 KBTU/SQFT-YR GROSS-AREA      302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTDRIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995

15:36:40 PDL RUN 1

BUILDING 2-1731 PART B (SECOND SECTION) BASE CASE

PRESENT ENERGY USAGE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
	-----	-----
TOTAL	1911.12	601.04

TOTAL SITE ENERGY	2512.19 MBTU	109.8 KBTU/SQFT-YR GROSS-AREA	109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6340.23 MBTU	277.0 KBTU/SQFT-YR GROSS-AREA	277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995

15:58:56 PDL RUN 1

BUILDING 2-1731 PART C (THIRD SECTION) BASE CASE  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	32.17	621.20
SPACE COOL	601.67	0.00
HVAC AUX	402.21	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
<hr/>		
TOTAL	1911.79	621.20

TOTAL SITE ENERGY    2532.99 MBTU    110.7 KBTU/SQFT-YR GROSS-AREA    110.7 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    6362.32 MBTU    278.0 KBTU/SQFT-YR GROSS-AREA    278.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

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1/10/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995

16: 2:44 PDL RUN 1

BUILDING 2-1731 PART A (FIRST SECTION)

ECO 5

NEW FUEL OIL BOILER

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	705.97
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1965.15	705.97

TOTAL SITE ENERGY	2671.12 MBTU	121.2 KBTU/SQFT-YR GROSS-AREA	121.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6607.32 MBTU	299.8 KBTU/SQFT-YR GROSS-AREA	299.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

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1/10/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1731 PART C (THIRD SECTION) ECO 5  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995

17:55:50 PDL RUN 1

NEW FUEL OIL BOILER

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	29.95	533.97
SPACE COOL	601.67	0.00
HVAC AUX	413.62	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
-----		
TOTAL	1920.99	533.97

TOTAL SITE ENERGY      2454.97 MBTU      107.3 KBTU/SQFT-YR GROSS-AREA      107.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY      6302.72 MBTU      275.4 KBTU/SQFT-YR GROSS-AREA      275.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1731BEC5.SIM

1/10/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/10/1995

16:13:59 PDL RUN 1

BUILDING 2-1731 PART B (SECOND SECTION) ECO 5

NEW FUEL OIL BOILER

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	31.12	554.80
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
<hr/>		
TOTAL	1911.12	554.80

TOTAL SITE ENERGY	2465.95 MBTU	107.7 KBTU/SQFT-YR GROSS-AREA	107.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6294.00 MBTU	275.0 KBTU/SQFT-YR GROSS-AREA	275.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

12-Jan-95

MeansData for Lotus

Page 1

=====  
Estimate: BLDG 1731 ECO-5 Date: 22-Dec-94  
Description: INSTALL OIL BOILER  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1551207300	HTG BLR OIL STL JCK&BRN HTW 2835MBH						1.00 Ea.
Unit values	141.00	26973.00	2253.63	0.00	0.00	0.00	29226.63
Totals	141.00	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$0	\$29,227

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$496			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$26,973		\$2,750		\$0	\$29,723
CONTINGENCY	15.00%					\$0	\$4,458
BOND	3.00%						\$892
PROFIT	10.00%						\$2,972
JOB TOTAL							\$38,045

=====
Estimate: BLDG 1731 ECO-5 Date: 22-Dec-94
Description: INSTALL OIL BOILER
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
TOTAL	141	\$26,973	\$2,254	\$0	\$0	\$29,227
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$496			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$26,973	\$2,750	\$0	\$0	\$29,723
CONTINGENCY	15.00%					\$4,458
BOND	3.00%					\$892
PROFIT	10.00%					\$2,972
JOB TOTAL						\$38,045

## **11 ECO - 6 CALCULATIONS**

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-6: HVAC Renovation. For the buildings in this ECO, multiple options have been calculated when applicable. These options include:

1. Install new variable air volume (VAV) air handlers
2. Install more efficient chillers
3. Install central VAV air handling units to replace window units

A single life-cycle cost analysis and cost estimate was performed for each building which grouped all applicable options together.

## 11 ECO - 6 CALCULATIONS

LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC

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## LIFE CYCLE COST ANALYSIS SUMMARY FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

<b>DISCRETE PORTION NAME:</b>	Fort Bragg, NC
<b>PROJECT NAME:</b>	HVAC Renovations in Historic Red Brick Area
<b>TOTAL INVESTMENT:</b>	\$1,591,477
<b>MBTU/YEAR SAVED:</b>	3,164
<b>DISCOUNTED ENERGY SAVINGS:</b>	\$1,212,880
<b>DISCOUNTED DEMAND SAVINGS:</b>	0
<b>TOTAL ENERGY SAVINGS:</b>	\$1,212,880
<b>TOTAL NON-ENERGY SAVINGS:</b>	\$1,189,671
<b>FIRST YEAR DOLLAR SAVINGS:</b>	\$148,958
<b>SIMPLE PAYBACK IN YEARS:</b>	10.68
<b>TOTAL NET SAVINGS:</b>	\$2,402,551
<b>SAVINGS TO INVESTMENT RATIO:</b>	1.51

### **REQUIREMENT:**

This project encompasses a number of different modifications to HVAC systems. The evaluation applies only to areas which are both heated and cooled within each building. Where existing HVAC systems used chilled water, the renovations incorporated chilled water replacement components. Similarly, if the existing system was a direct-expansion (DX) system the replacement incorporated DX units. The completion of this project will save Fort Bragg 927 MWH of energy and \$148,958 annually to help meet the requirements of the Energy Policy Act of 1992 (PL 102-486). This act states that Fort Bragg must achieve a 30% reduction in its energy consumption from FY 1985 to the FY 2005.

### **DESCRIPTION OF PROPOSED CONSTRUCTION:**

This project includes replacing air handlers with new VAV air handlers and replacing chillers with more energy efficient chillers. The project also proposes replacing window air conditioners with packaged DX variable-air volume air handlers.

### **CURRENT CONDITIONS:**

The energy lost due to the current usage of inefficient HVAC systems is in excess of 927 MWH per year and costs \$148,958 per year. At this rate a more energy efficient HVAC system would pay for itself in approximately 10.68 years.

### **IMPACT IF NOT PROVIDED:**

If this project is not funded, Fort Bragg will continue to spend in additional utility and operating costs over the next 10.68 years enough to purchase the more efficient HVAC systems. Also, if this project is not funded, Fort Bragg will have more difficulty meeting the mandates of the Energy Policy Act of 1992(PL 102-486).

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO6  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: ECO6-TOTAL  
 ANALYSIS DATE: 04-19-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 1446799.
B. SIOH	\$ 72339.
C. DESIGN COST	\$ 72339.
D. TOTAL COST (1A+1B+1C)	\$ 1591477.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 1591477.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	503.	\$ 17580.	15.08	\$ 265104.
B. DIST	\$ 19.18	2661.	\$ 51038.	18.57	\$ 947775.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		3164.	\$ 68618.		\$ 1212880.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)				\$ 8000.
(1) DISCOUNT FACTOR (TABLE A)			14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)				\$ 119040.
B. NON RECURRING SAVINGS (+) / COSTS (-)				
ITEM	SAVINGS (+) COST (-)	YR OC (1) (2)	DISCNT FACTR (3) (2)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATION	\$1446799.	10	.74	1070631.
d. TOTAL	\$1446799.			1070631.
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$ 1189671.			
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE))	\$ 148958.			
5. SIMPLE PAYBACK PERIOD (1G/4)				10.68 YEARS
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)				\$ 2402551.
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY)				1.51
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):				5.14 %

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1242  
 ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO6  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 68804.
B. SIOH	\$ 3440.
C. DESIGN COST	\$ 3440.
D. TOTAL COST (1A+1B+1C)	\$ 75684.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 75684.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	-11.	\$ -379.	15.08	\$ -5713.
B. DIST	\$ 19.18	198.	\$ 3794.	18.57	\$ 70458.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.		
N. TOTAL		187.	\$ 3415.		\$ 64745.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATIONS	\$ 75437.	10	.74	\$ 55823.
d. TOTAL	\$ 75437.			\$ 55823.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 70703.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE)) \$ 8187.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.24 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 135448.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.79  
 (IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 6.04 %

1242.SIM

1/10/95

Page 1

FT BRAGG ENERGY STUDY

BUILDING 1242

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 9/1995

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
	-----	-----
TOTAL	1613.84	1328.59

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 1/12/1995 9:26:59 PDL RUN 1  
BUILDING 1242 ECO-6 HVAC RENOVATIONS  
PROJECT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY      FUEL-OIL

**CATEGORY OF USE**

SPACE HEAT	33.83	653.42
SPACE COOL	471.39	0.00
HVAC AUX	280.82	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
	-----	-----
TOTAL	1650.82	653.42

TOTAL SITE ENERGY 2410.52 MBTU 125.3 KBTU/SQFT-YR GROSS-AREA 125.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 5929.99 MBTU 308.2 KBTU/SQFT-YR GROSS-AREA 308.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.7  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
Estimate: BLDG 1242 ECO-6 Date: 16-Mar-95
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1556513060	HTGINSL DUK BLKT 1"FGLS 1.5#DENSE					800.00 S.F.	
Unit values	0.05	0.50	0.67	0.00	0.00		1.17
Totals	36.80	\$400	\$537	\$0	\$0		\$937
1571251550	CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR					1.00 Ea.	
Unit values	44.44	4970.03	710.88	0.00	0.00		5680.90
Totals	44.44	\$4,970	\$711	\$0	\$0		\$5,681
1571900520	WATER CHILLER RECIPROCATING AIR COOLED 40 TON					1.00 Ea.	
Unit values	133.00	19180.80	2178.00	0.00	0.00		21358.80
Totals	133.00	\$19,181	\$2,178	\$0	\$0		\$21,359
1572010390	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72"					1.00 Ea.	
Unit values	12.03	689.31	184.53	0.00	0.00		873.84
Totals	12.03	\$689	\$185	\$0	\$0		\$874
1572010430	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84"					1.00 Ea.	
Unit values	17.78	844.16	275.28	0.00	0.00		1119.43
Totals	17.78	\$844	\$275	\$0	\$0		\$1,119
1572500580	Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb.					1500.00 Lb.	
Unit values	0.08	0.36	1.30	0.00	0.00		1.66
Totals	126.00	\$539	\$1,951	\$0	\$0		\$2,490
1574200001	VAV CONTROL PACKAGE - DDC					1.00 LOT	
Unit values	0.00	5500.00	800.00	0.00	0.00		6300.00
Totals	0.00	\$5,500	\$800	\$0	\$0		\$6,300
1574200003	VARIABLE SPEED DRIVE 15 HP					1.00 EA	
Unit values	0.00	2000.00	500.00	0.00	0.00		2500.00
Totals	0.00	\$2,000	\$500	\$0	\$0		\$2,500

16-Mar-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL		371	\$34,123	\$7,137	\$0	\$0	\$41,260
1681303700	VAV BOXES 800 CFM					8.00 EA	
Unit values	0.00	1200.00	100.00	0.00	0.00	1300.00	
Totals	0.00	\$9,600	\$800	\$0	\$0	\$10,400	
1681303800	ELEC THERMOSTAT LINE				8.00 Ea.		
Unit values	1.00	24.54	15.51	0.00	0.00	40.05	
Totals	8.00	\$196	\$124	\$0	\$0	\$320	
U16 ELECTRICAL		8	\$9,796	\$924	\$0	\$0	\$10,720

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		379	\$43,919	\$8,061	\$0	\$0	\$51,980
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$1,773			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENCY		\$43,919	\$9,834	\$0	\$0	\$53,753	
CONTINGENCY	15.00%					\$8,063	
BOND	3.00%					\$1,613	
PROFIT	10.00%					\$5,375	
JOB TOTAL							\$68,804

=====
 Estimate: BLDG 1242 ECO-6 Date: 16-Mar-95  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	371	\$34,123	\$7,137	\$0	\$0	\$41,260
U16 ELECTRICAL	8	\$9,796	\$924	\$0	\$0	\$10,720
<b>TOTAL</b>	<b>379</b>	<b>\$43,919</b>	<b>\$8,061</b>	<b>\$0</b>	<b>\$0</b>	<b>\$51,980</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$1,773			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$43,919</b>	<b>\$9,834</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$53,753</b>
CONTINGENCY	15.00%					\$8,063
BOND	3.00%					\$1,613
PROFIT	10.00%					\$5,375
<b>JOB TOTAL</b>						<b>\$68,804</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 STUDY: ECO6  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1326  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 392648.
B. SIOH	\$ 19632.
C. DESIGN COST	\$ 19632.
D. TOTAL COST (1A+1B+1C)	\$ 431912.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 431912.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	'310.	\$ 10841.	15.08	\$ 163484.
B. DIST	\$ 19.18	641.	\$ 12295.	18.57	\$ 228324.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		951.	\$ 23136.		\$ 391809.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+)/ COST (-) (4)
1. FUTURE RENOVATIONS	\$ 392648.	10	.74	290560.
d. TOTAL	\$ 392648.			290560.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4) \$ 305440.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1/(YRS ECONOMIC LIFE)) \$ 43769.

5. SIMPLE PAYBACK PERIOD (1G/4) 9.87 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 697248.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.61  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 5.50 %

FT BRAGG ENERGY STUDY  
BUILDING 1-1326 HQ BLDG  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 6/1995 14:16:42 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	285.53	5085.34
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
-----		
TOTAL	6248.75	5085.34

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1326EC06.SIM

1/12/95

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FT BRAGG ENERGY STUDY  
BUILDING 1-1326 HQ BLDG  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
ECO-6

DOE-2.1C 1/12/1995 9:45:33 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	141.65	2896.45
SPACE COOL	1251.83	0.00
HVAC AUX	805.91	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.51	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
-----		
TOTAL	5190.07	2896.45

TOTAL SITE ENERGY 8086.31 MBTU 137.0 KBTU/SQFT-YR GROSS-AREA 137.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 18481.62 MBTU 313.1 KBTU/SQFT-YR GROSS-AREA 313.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 31.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
 Estimate: BLDG 1326 ECO-6 Date: 22-Dec-94  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1556513060	HTGINSL DUK BLKT 1"FGS 1.5#DENSE					6000.00 S.F.	
Unit values	0.05	0.50	0.67	0.00	0.00		1.17
Totals	276.00	\$2,997	\$4,029	\$0	\$0		\$7,026
1571251550	CENTRAL STATION CHILLED WATER AHU 10,000 CFM					7.00 Ea.	
Unit values	44.44	4970.03	710.88	0.00	0.00		5680.90
Totals	311.11	\$34,790	\$4,976	\$0	\$0		\$39,766
1571900650	WATER CHILLER RECIPROCATING AIR COOLED 175 TON					1.00 Ea.	
Unit values	533.00	87412.50	8712.00	517.28	0.00		96641.78
Totals	533.00	\$87,413	\$8,712	\$517	\$0		\$96,642
1572010390	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72"					7.00 Ea.	
Unit values	12.03	689.31	184.53	0.00	0.00		873.84
Totals	84.21	\$4,825	\$1,292	\$0	\$0		\$6,117
1572010430	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84"					7.00 Ea.	
Unit values	17.78	844.16	275.28	0.00	0.00		1119.43
Totals	124.45	\$5,909	\$1,927	\$0	\$0		\$7,836
1572500580	Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb.					10000.00 Lb.	
Unit values	0.08	0.36	1.30	0.00	0.00		1.66
Totals	840.00	\$3,596	\$13,008	\$0	\$0		\$16,604
1574200001	VAV CONTROL PAKAGE - DDC					1.00 LOT	
Unit values	0.00	22500.00	5000.00	0.00	0.00		27500.00
Totals	0.00	\$22,500	\$5,000	\$0	\$0		\$27,500
1574200002	VARIABLE SPEED DRIVE 10 HP					7.00 EA	
Unit values	0.00	1500.00	500.00	0.00	0.00		2000.00
Totals	0.00	\$10,500	\$3,500	\$0	\$0		\$14,000

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	2169 VAV BOXES 800 CFM	2169	\$172,530	\$42,444	\$517	\$0	\$215,491
1681303700	VAV BOXES 800 CFM				60.00 EA		
Unit values	0.00	1200.00	100.00	0.00	0.00	1300.00	
Totals	0.00	\$72,000	\$6,000	\$0	\$0	\$78,000	
1681303800	ELEC THERMOSTAT LINE				60.00 Ea.		
Unit values	1.00	24.54	15.51	0.00	0.00	40.05	
Totals	60.00	\$1,472	\$931	\$0	\$0	\$2,403	
U16 ELECTRICAL	60	\$73,472	\$6,931	\$0	\$0	\$0	\$80,403

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Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	2229	\$246,002	\$49,375	\$517	\$0	\$295,894
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$10,863			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$246,002	\$60,238	\$517	\$0	\$306,757	
CONTINGENCY	15.00%					\$46,013
BOND	3.00%					\$9,203
PROFIT	10.00%					\$30,676
JOB TOTAL						\$392,648

=====  
 Estimate: BLDG 1326 ECO-6 Date: 22-Dec-94

Description: HVAC RENOVATIONS

Project: ECIP / FEMP Bid Date:

Location: FORT BRAGG NC Job #: 94013.05

Sq. footage: City indx:Raleigh, NC

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#### SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	2169	\$172,530	\$42,444	\$517	\$0	\$215,491
U16 ELECTRICAL	60	\$73,472	\$6,931	\$0	\$0	\$80,403
<b>TOTAL</b>	<b>2229</b>	<b>\$246,002</b>	<b>\$49,375</b>	<b>\$517</b>	<b>\$0</b>	<b>\$295,894</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$10,863			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$246,002		\$60,238	\$517	\$0	\$306,757
CONTINGENCY	15.00%					\$46,013
BOND	3.00%					\$9,203
PROFIT	10.00%					\$30,676
<b>JOB TOTAL</b>						<b>\$392,648</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 1-1333  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO6  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 70111.
B. SIOH	\$ 3506.
C. DESIGN COST	\$ 3506.
D. TOTAL COST (1A+1B+1C)	\$ 77123.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 77123.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	46.	\$ 1594.	15.08	\$ 24033.
B. DIST	\$ 19.18	-10.	\$ -195.	18.57	\$ -3629.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		35.	\$ 1398.		\$ 20404.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-)	YR OC (1)	DISCNT FACTR (2)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATIONS	\$ 70111.	10	.74	51882.
d. TOTAL	\$ 70111.			51882.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 66762.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 5904.

5. SIMPLE PAYBACK PERIOD (1G/4) 13.06 YEAR.

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 87166.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.13  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/3/1995 15:32:6 PDL RUN 1

BUILDING 1-1333

BASE CASE

PRESENT ENERGY USAGE

REPORT - BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

## ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	79.52	891.42
SPACE COOL	347.65	0.00
HVAC AUX	192.92	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
	-----	-----
TOTAL	1247.85	891.42

TOTAL SITE ENERGY	2139.24 MBTU	162.3 KBTU/SQFT-YR GROSS-AREA	162.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	4638.62 MBTU	351.9 KBTU/SQFT-YR GROSS-AREA	351.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1333EC06.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1333  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/12/95

Page 1

HISTORIC RED BRICK BLDG AREA  
ECO-6

DOE-2.1C 1/12/1995 9:44: 8 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE		
IN SITE MBTU -	ELECTRICITY	FUEL-OIL
CATEGORY OF USE		
SPACE HEAT	85.91	926.20
SPACE COOL	265.92	0.00
HVAC AUX	112.64	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
-----		
TOTAL	1092.22	926.20

TOTAL SITE ENERGY 2018.41 MBTU 153.1 KBTU/SQFT-YR GROSS-AREA 153.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 4206.11 MBTU 319.1 KBTU/SQFT-YR GROSS-AREA 319.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 6.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
Estimate: BLDG 1333 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1556513060	HTGINSL DUK BLKT 1"FGS 1.5#DENSE					1000.00	S.F.
Unit values	0.05	0.50	0.67	0.00	0.00	0.00	1.17
Totals	46.00	\$500	\$672	\$0	\$0	\$0	\$1,172
1571806050	ROOF TOP A/C SINGLE ZONE ELECTRIC COOL VAV 40 TON					1.00	Ea.
Unit values	200.00	32067.90	3267.00	0.00	0.00	0.00	35334.90
Totals	200.00	\$32,068	\$3,267	\$0	\$0	\$0	\$35,335
1572500580	Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb.					2000.00	Lb.
Unit values	0.08	0.36	1.30	0.00	0.00	0.00	1.66
Totals	168.00	\$719	\$2,602	\$0	\$0	\$0	\$3,321
1574200001	VAV CONTROL PAKAGE - DDC					1.00	LOT
Unit values	0.00	7500.00	2500.00	0.00	0.00	0.00	10000.00
Totals	0.00	\$7,500	\$2,500	\$0	\$0	\$0	\$10,000
1574200003	VARIABLE SPEED DRIVE 15 HP					1.00	EA
Unit values	0.00	2000.00	500.00	0.00	0.00	0.00	2500.00
Totals	0.00	\$2,000	\$500	\$0	\$0	\$0	\$2,500
U15 MECHANICAL	414	\$42,787	\$9,541	\$0	\$0	\$0	\$52,328

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1681303800	ELEC THERMOSTAT LINE					
Unit values	1.00	24.54	15.51	0.00	8.00 Ea.	
Totals	8.00	\$196	\$124	\$0	0.00 \$0	40.05 \$320
U16 ELECTRICAL	8	\$196	\$124	\$0	\$0	\$320

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	422	\$42,983	\$9,665		\$0	\$52,648
SALES TAX	0.00%		\$0			
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$2,126			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$42,983	\$11,791		\$0	\$54,774
CONTINGENCY	15.00%					\$8,216
BOND	3.00%					\$1,643
PROFIT	10.00%					\$5,477
JOB TOTAL						\$70,111

=====
 Estimate: BLDG 1333 ECO-6 Date: 22-Dec-94  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	414	\$42,787	\$9,541	\$0	\$0	\$52,328
U16 ELECTRICAL	8	\$196	\$124	\$0	\$0	\$320
<b>TOTAL</b>	<b>422</b>	<b>\$42,983</b>	<b>\$9,665</b>	<b>\$0</b>	<b>\$0</b>	<b>\$52,648</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$2,126			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$42,983</b>	<b>\$11,791</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$54,774</b>
CONTINGENCY	15.00%					\$8,216
BOND.	3.00%					\$1,643
PROFIT	10.00%					\$5,477
<b>JOB TOTAL</b>						<b>\$70,111</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1105  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO6  
 LCCID FY95 (92)

1. INVESTMENT  
 A. CONSTRUCTION COST \$ 252148.  
 B. SIOH \$ 12607.  
 C. DESIGN COST \$ 12607.  
 D. TOTAL COST (1A+1B+1C) \$ 277362.  
 E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.  
 F. PUBLIC UTILITY COMPANY REBATE \$ 0.  
 G. TOTAL INVESTMENT (1D - 1E - 1F) \$ 277362.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)
A. ELECT	\$ 34.95	-77.	\$ -2691.	15.08	\$ -40583.
B. DIST	\$ 19.18	1044.	\$ 20026.	18.57	\$ 371880.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		967.	\$ 17335.		\$ 331297.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATION	\$ 252148.	10	.74	\$ 186590.
d. TOTAL	\$ 252148.			\$ 186590.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 201470.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 30942.

5. SIMPLE PAYBACK PERIOD (1G/4) 8.96 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 532767.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.92  
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : 6.42 %

FT BRAGG ENERGY STUDY  
BUILDING 2-1105  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BUILDING AREA  
BASE CASE  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 4/1995 PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

1105.SIM

9:10:45 PDL RUN 1

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	230.21	4552.14
SPACE COOL	1267.76	0.00
HVAC AUX	1808.60	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	3329.45	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	412.70	0.00
	-----	-----
TOTAL	7048.73	4552.14

TOTAL SITE ENERGY 11601.09 MBTU 157.0 KBTU/SQFT-YR GROSS-AREA 157.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 25720.15 MBTU 348.0 KBTU/SQFT-YR GROSS-AREA 348.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.1

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1105EC06.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1105  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/11/95

Page 1

HISTORIC RED BRICK BUILDING AREA  
ECO-6

DOE-2.1C 1/11/1995 10:29:10 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	55.46	988.64
SPACE COOL	1966.33	0.00
HVAC AUX	1547.59	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	3329.46	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	412.70	0.00
	-----	-----
TOTAL	7311.53	988.64

TOTAL SITE ENERGY 8300.24 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 22945.40 MBTU 310.5 KBTU/SQFT-YR GROSS-AREA 310.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 2.6

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

Estimate: BLDG 1105 ECO-6 Date: 22-Dec-9

Description: HVAC RENOVATIONS

Description: HVAC RENOVATION  
Project: ECIP / FEMP

Bid Date:

Project: ECR-7, PEARL  
Location: FORT BRAGG NC

Job #: 94013.05

Sq. footage:

City indx:Raleigh, NC

Line #	Description						
	Manhours	Matl	Labor	Equipment	Sub	Total	
1556513060							
	HTGINSL DUK BLKT 1"FGLS 1.5#DENSE					3000.00 S.F.	
Unit values	0.05	0.50	0.67	0.00	0.00	1.17	
Totals	138.00	\$1,499	\$2,015	\$0	\$0	\$3,514	
1571251550							
	CENTRAL STATION CHILLED WATER AHU 10,000 CFM						
	MODULAR					4.00 Ea.	
Unit values	44.44	4970.03	710.88	0.00	0.00	5680.90	
Totals	177.78	\$19,880	\$2,844	\$0	\$0	\$22,724	
1571900630							
	AC&V WTR CHL RECIP AIR COOL 125 TON					1.00 Ea.	
Unit values	400.00	48951.00	6534.00	387.20	0.00	55872.20	
Totals	400.00	\$48,951	\$6,534	\$387	\$0	\$55,872	
1572010390							
	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN						
	2ROWX8FIN 24" X 72"					4.00 Ea.	
Unit values	12.03	689.31	184.53	0.00	0.00	873.84	
Totals	48.12	\$2,757	\$738	\$0	\$0	\$3,495	
1572010430							
	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN					4.00 Ea.	
	2ROWX8FIN 30" X 84"						
Unit values	17.78	844.16	275.28	0.00	0.00	1119.43	
Totals	71.11	\$3,377	\$1,101	\$0	\$0	\$4,478	
1572500580							
	Galv. steel rectangular duct, incl. ftngs.,						
	hangers, over 5,000 lb.					5000.00 Lb.	
Unit values	0.08	0.36	1.30	0.00	0.00	1.66	
Totals	420.00	\$1,798	\$6,504	\$0	\$0	\$8,302	
1574200001							
	VAV CONTROL PAKAGE - DDC					1.00 LOT	
Unit values	0.00	12500.00	2500.00	0.00	0.00	15000.00	
Totals	0.00	\$12,500	\$2,500	\$0	\$0	\$15,000	
1574200003							
	VARIABLE SPEED DRIVE 15 HP					4.00 EA	
Unit values	0.00	2000.00	500.00	0.00	0.00	2500.00	
Totals	0.00	\$8,000	\$2,000	\$0	\$0	\$10,000	

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1255 VAV BOXES 800 CFM	1255	\$98,762	\$24,236	\$387	\$0	\$123,385
1681303700	VAV BOXES 800 CFM				50.00 EA		
Unit values	0.00	1200.00	100.00	0.00	0.00	1300.00	
Totals	0.00	\$60,000	\$5,000	\$0	\$0	\$65,000	
1681303800	ELEC THERMOSTAT LINE				50.00 Ea.		
Unit values	1.00	24.54	15.51	0.00	0.00	40.05	
Totals	50.00	\$1,227	\$776	\$0	\$0	\$2,003	
U16 ELECTRICAL		50	\$61,227	\$5,776	\$0	\$0	\$67,003

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	1305	\$159,989	\$30,012	\$387	\$0	\$190,388
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$6,603			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$159,989	\$36,615	\$387	\$0	\$196,991	
CONTINGENCY	15.00%					\$29,549
BOND	3.00%					\$5,910
PROFIT	10.00%					\$19,699
JOB TOTAL						\$252,148

=====
 Estimate: BLDG 1105 ECO-6 Date: 22-Dec-94  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1255	\$98,762	\$24,236	\$387	\$0	\$123,385
U16 ELECTRICAL	50	\$61,227	\$5,776	\$0	\$0	\$67,003
<b>TOTAL</b>	<b>1305</b>	<b>\$159,989</b>	<b>\$30,012</b>	<b>\$387</b>	<b>\$0</b>	<b>\$190,388</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$6,603			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$159,989</b>	<b>\$36,615</b>	<b>\$387</b>	<b>\$0</b>	<b>\$196,991</b>	
CONTINGENCY	15.00%					\$29,549
BOND	3.00%					\$5,910
PROFIT	10.00%					\$19,699
<b>JOB TOTAL</b>						<b>\$252,148</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO6  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3 LCCID FY95 (92)  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1120  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 81909.
B. SIOH	\$ 4095.
C. DESIGN COST	\$ 4095.
D. TOTAL COST (1A+1B+1C)	\$ 90099.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 90099.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	48.	\$ 1671.	15.08	\$ 25193.
B. DIST	\$ 19.18	0.	\$ 0.	18.57	\$ 0.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		48.	\$ 1671.		\$ 25193.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-)	YR (1)	DISCNT OC (2)	DISCOUNTED SAVINGS (+) / COST (-) (4)
		(3)		
1. FUTURE RENOVATIONS	\$ 81909.	10	.74	60613.
d. TOTAL	\$ 81909.			60613.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4) \$ 75493.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 6766.

5. SIMPLE PAYBACK PERIOD (1G/4)

13.32 YEAR

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 100685.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.12  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

N/A

FT BRAGG ENERGY STUDY  
BUILDING 2-1120  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 6/1995 9:26: 7 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

1120.SIM

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
	-----	-----
TOTAL	3885.73	4735.99

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1120EC06.SIM

1/11/95

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HISTORIC RED BRICK BLDG AREA

ECO-6

FT BRAGG ENERGY STUDY  
BUILDING 2-1120  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/11/1995

HVAC RENOVATIONS

WEATHER FILE-

10:28:35 PDL RUN 1

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	821.39	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
	-----	-----
TOTAL	3722.58	4735.99

TOTAL SITE ENERGY 8458.40 MBTU 114.0 KBTU/SQFT-YR GROSS-AREA 114.0 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 15914.41 MBTU 214.5 KBTU/SQFT-YR GROSS-AREA 214.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====  
 Estimate: BLDG 1120 ECO-6 Date: 22-Dec-94  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC  
 =====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1517012110	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM					50.00	L.F.
Unit values	0.43	9.44	6.66	0.83	0.00	0.00	16.93
Totals	21.60	\$472	\$333	\$42	\$0	\$0	\$847
1556515380	PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE					50.00	L.F.
Unit values	0.13	3.05	1.88	0.00	0.00	0.00	4.92
Totals	6.40	\$152	\$94	\$0	\$0	\$0	\$246
1571901210	WATER CHILLER WATER COOLED RECIP SEMI-HERMET- IC 160 TON					1.00	Ea.
Unit values	400.00	54445.50	6534.00	387.20	0.00	0.00	61366.70
Totals	400.00	\$54,446	\$6,534	\$387	\$0	\$0	\$61,367
U15 MECHANICAL		428	\$55,070	\$6,961	\$429	\$0	\$62,460

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	428	\$55,070	\$6,961	\$429	\$0	\$62,460
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$1,531			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$55,070	\$8,492	\$429	\$0	\$63,991
CONTINGENCY	15.00%					\$9,599
BOND	3.00%					\$1,920
PROFIT	10.00%					\$6,399
JOB TOTAL						\$81,909

=====  
 Estimate: BLDG 1120 ECO-6 Date: 22-Dec-94  
 Description: HVAC RENOVATIONS

Project: ECIP / FEMP Bid Date:  
 Location: FORT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC  
 =====

SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	428	\$55,070	\$6,961	\$429	\$0	\$62,460
TOTAL	428	\$55,070	\$6,961	\$429	\$0	\$62,460
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$1,531			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$55,070	\$8,492	\$429	\$0	\$63,991
CONTINGENCY	15.00%					\$9,599
BOND	3.00%					\$1,920
PROFIT	10.00%					\$6,399
JOB TOTAL						\$81,909

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECO6  
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)  
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1127  
ANALYSIS DATE: 03-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

## 1. INVESTMENT

A. CONSTRUCTION COST	\$	61851.
B. SIOH	\$	3093.
C. DESIGN COST	\$	3093.
D. TOTAL COST (1A+1B+1C)	\$	68037.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.
F. PUBLIC UTILITY COMPANY REBATE	\$	0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$	68037.

## 2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	79.	\$ 2747.	15.08	\$ 41431.
B. DIST	\$ 19.18	0.	\$ 0.	18.57	\$ 0.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		79.	\$ 2747.		\$ 41431.

### 3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$	1000.
(1) DISCOUNT FACTOR (TABLE A)	14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$	14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)  
SAVINGS (+)      YR      DISCNT      DISCOUNTED

ITEM SAVINGS (+) IN DISCEN<sup>T</sup> DISCOUNTED SAVINGS (+) / COST (-) OGC FACTR

1. FUTURE RENOVATION \$ 63154. 10 .74 COST (-) (4) 46734.

1. FUTURE RENOVATION \$ 63154 . 10 .74 46734 .

1 TOTAL 63154 46731

a. TOTAL 63154. 46734.

TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd1) \$

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$

FIRST YEAR DOLLAR SAVINGS 2N3+3A+ (3Bd1 / (YRS ECONOMIC LIFE)) \$ 6905.

5 SIMPLE PAYBACK PERIOD (1G/4) 9.85 YEA

6. TOTAL NET DISCOUNTED SAVINGS (2NE12G)

(IF < 1 PROJECT DOES NOT QUALIFY)

Project does not qualify for ECFI funding, 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) : N/A

\*\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

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BRAGG ENERGY STUDY  
ILDING 2-1127  
~~POST-~~ BEPS ESTIMAT

# HISTORIC RED BRICK BUILDING AREA BASE CASE PERFORMANCE

DOE-2.1C 12 22 1994 8:24:33 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

**CATEGORY OF USE**

SPACE HEAT	178.99	3457.19
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
	-----	-----
TOTAL	4799.69	3457.19

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1127EC06.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 2-1127  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/11/95

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HISTORIC RED BRICK BUILDING AREA  
ECO-6  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/11/1995 12:17:48 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	178.99	3457.19
SPACE COOL	1165.05	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
-----		
TOTAL	4531.38	3457.19

TOTAL SITE ENERGY 7988.56 MBTU 138.2 KBTU/SQFT-YR GROSS-AREA 138.2 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 17064.89 MBTU 295.2 KBTU/SQFT-YR GROSS-AREA 295.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
 Estimate: BLDG 1127 ECO-6 Date: 16-Mar-95
 Description: HVAC RENOVATIONS
 Project: ECIP / FEMP Bid Date:
 Location: FT BRAGG NC Job #: 94013.05
 Sq. footage: City indx:Raleigh, NC
 =====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1517012110	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10' OC BLK 4" DIAM					50.00 L.F.	
Unit values	0.43 9.44	6.66	0.83	0.00	\$0	16.93	
Totals	21.60	\$472	\$333	\$42	\$0	\$847	
1556515380	PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE				50.00 L.F.		
Unit values	0.13 3.05	1.88	0.00	0.00	\$0	4.92	
Totals	6.40	\$152	\$94	\$0	\$0	\$246	
1571901170	AC&V WTR CHLRS RECPRCTG WTR COOLED MULTIPLE COMPRESS. SEMI-HERM. 110 TON				1.00 Ea.		
Unit values	290.00 41058.90	4749.25	281.33	0.00	\$0	46089.48	
Totals	290.00	\$41,059	\$4,749	\$281	\$0	\$46,089	
U15 MECHANICAL	318	\$41,683	\$5,176	\$323	\$0	\$47,182	

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		318	\$41,683	\$5,176	\$323	\$0	\$47,182
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$1,139			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$41,683		\$6,315	\$323	\$0	\$48,321
CONTINGENCY	15.00%						\$7,248
BOND	3.00%						\$1,450
PROFIT	10.00%						\$4,832
JOB TOTAL							\$61,851

=====
 Estimate: BLDG 1127 ECO-6 Date: 16-Mar-95  
 Description: HVAC RENOVATIONS  
 Project: ECIP / FEMP Bid Date:  
 Location: FT BRAGG NC Job #: 94013.05  
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	318	\$41,683	\$5,176	\$323	\$0	\$47,182
TOTAL	318	\$41,683	\$5,176	\$323	\$0	\$47,182
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$1,139			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENCY		\$41,683	\$6,315	\$323	\$0	\$48,321
CONTINGENCY	15.00%					\$7,248
BOND	3.00%					\$1,450
PROFIT	10.00%					\$4,832
JOB TOTAL						\$61,851

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1138  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO6  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 244506.
B. SIOH	\$ 12225.
C. DESIGN COST	\$ 12225.
D. TOTAL COST (1A+1B+1C)	\$ 268956.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 268956.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	0.	\$ 9.	15.08	\$ 132.
B. DIST	\$ 19.18	279.	\$ 5359.	18.57	\$ 99508.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		280.	\$ 5367.		\$ 99639.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 1000.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 14880.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATIONS	\$ 244506.	10	.74	180934.
d. TOTAL	\$ 244506.			180934.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2 + 3Bd4) \$ 195814.

4. FIRST YEAR DOLLAR SAVINGS 2N3 + 3A + (3Bd1 / (YRS ECONOMIC LIFE)) \$ 18593.

5. SIMPLE PAYBACK PERIOD (1G/4)

14.47 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5 + 3C) \$ 295454.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 1.10  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR) :

N/A

FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART A (FIRST FLOOR)

DOE-2.1C 12/28/1994 10:15:52 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	398.05	1053.81
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1907.21	1053.81

TOTAL SITE ENERGY	2961.09 MBTU	91.3 KBTU/SQFT-YR GROSS-AREA	91.3 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6781.38 MBTU	209.1 KBTU/SQFT-YR GROSS-AREA	209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1388.SIM

1/10/95

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T BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE PART B (SECOND FLOOR)

DOE-2.1C 1/ 9/1995

14:13:37 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.62	873.22
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
<hr/>		
TOTAL	2263.21	873.22

TOTAL SITE ENERGY      3136.42 MBTU      165.3 KBTU/SQFT-YR GROSS-AREA      165.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY      7669.62 MBTU      404.1 KBTU/SQFT-YR GROSS-AREA      404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE PART C (THIRD FLOOR)

DOE-2.1C 1/ 9/1995

PRESENT ENERGY USAGE

WEATHER FILE-

14:58:48 PDL RUN 1

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	63.02	1901.29
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.34	0.00
	-----	-----
TOTAL	2174.70	1901.29

TOTAL SITE ENERGY    4076.03 MBTU    214.8 KBTU/SQFT-YR GROSS-AREA    214.8 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    8432.04 MBTU    444.3 KBTU/SQFT-YR GROSS-AREA    444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-6 PART A (FIRST FLOOR)

DOE-2.1C 1/12/1995

9:26:58 PDL RUN 1

HVAC RENOVATIONS

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	380.28	1136.70
SPACE COOL	285.07	0.00
HVAC AUX	372.53	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1829.75	1136.70

TOTAL SITE ENERGY      2966.52 MBTU      91.5 KBTU/SQFT-YR GROSS-AREA      91.5 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY      6631.65 MBTU      204.5 KBTU/SQFT-YR GROSS-AREA      204.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 7.1  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

11388EC6.SIM  
FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

1/12/95

Page 1

HISTORIC RED BRICK BLDG AREA  
ECO-6 PART B (SECOND FLOOR)

DOE-2.1C 1/12/1995 9:24:58 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE		
IN SITE MBTU - ELECTRICITY      FUEL-OIL		
CATEGORY OF USE		
SPACE HEAT	17.09	330.03
SPACE COOL	542.69	0.00
HVAC AUX	309.06	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.39	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
-----		
TOTAL	2202.59	330.03

TOTAL SITE ENERGY	2532.60 MBTU	133.4 KBTU/SQFT-YR GROSS-AREA	133.4 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6944.35 MBTU	365.9 KBTU/SQFT-YR GROSS-AREA	365.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
ORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
ECO-6 PART C (THIRD FLOOR)

DOE-2.1C 1/12/1995 11:10:53 PDL RUN 1  
HVAC RENOVATIONS  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	53.40	1408.07
SPACE COOL	454.70	0.00
HVAC AUX	471.78	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.38	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.35	0.00
	-----	-----
TOTAL	2313.62	1408.07

TOTAL SITE ENERGY 3721.69 MBTU 196.1 KBTU/SQFT-YR GROSS-AREA 196.1 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 8355.89 MBTU 440.3 KBTU/SQFT-YR GROSS-AREA 440.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.5  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
Estimate: BLDG 1138 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1556513060	HTGINSL DUK BLKT 1"FGLS 1.5#DENSE				3000.00	S.F.	
Unit values	0.05	0.50	0.67	0.00	0.00	1.17	
Totals	138.00	\$1,499	\$2,015	\$0	\$0	\$3,514	
1571251550	CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR				4.00	Ea.	
Unit values	44.44	4970.03	710.88	0.00	0.00	5680.90	
Totals	177.78	\$19,880	\$2,844	\$0	\$0	\$22,724	
1571900600	AC&V WTR CHL RECPG AIR COOL 100 TON				1.00	Ea.	
Unit values	320.00	44955.00	5233.25	0.00	0.00	50188.25	
Totals	320.00	\$44,955	\$5,233	\$0	\$0	\$50,188	
1572010390	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72"				4.00	Ea.	
Unit values	12.03	689.31	184.53	0.00	0.00	873.84	
Totals	48.12	\$2,757	\$738	\$0	\$0	\$3,495	
1572010430	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84"				4.00	Ea.	
Unit values	17.78	844.16	275.28	0.00	0.00	1119.43	
Totals	71.11	\$3,377	\$1,101	\$0	\$0	\$4,478	
1572500580	Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb.				5000.00	Lb.	
Unit values	0.08	0.36	1.30	0.00	0.00	1.66	
Totals	420.00	\$1,798	\$6,504	\$0	\$0	\$8,302	
1574200001	VAV CONTROL PAKAGE - DDC				1.00	LOT	
Unit values	0.00	12500.00	2500.00	0.00	0.00	15000.00	
Totals	0.00	\$12,500	\$2,500	\$0	\$0	\$15,000	
1574200003	VARIABLE SPEED DRIVE 15 HP				4.00	EA	
Unit values	0.00	2000.00	500.00	0.00	0.00	2500.00	
Totals	0.00	\$8,000	\$2,000	\$0	\$0	\$10,000	

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1175	\$94,766	\$22,935		\$0	\$0	\$117,701
1681303700	VAV BOXES 800 CFM				50.00 EA		
Unit values	0.00	1200.00	100.00	0.00	0.00	1300.00	
Totals	0.00	\$60,000	\$5,000	\$0	\$0	\$65,000	
1681303800	ELEC THERMOSTAT LINE				50.00 Ea.		
Unit values	1.00	24.54	15.51	0.00	0.00	40.05	
Totals	50.00	\$1,227	\$776	\$0	\$0	\$2,003	
U16 ELECTRICAL	50	\$61,227	\$5,776		\$0	\$0	\$67,003

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	1225	\$155,993	\$28,711		\$0	\$184,704
SALES TAX	0.00%		\$0			
MATL MARKUP	0.00%		\$0			
LABOR MARKUP	22.00%		\$6,316			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$155,993	\$35,027		\$0	\$0	\$191,020
CONTINGENCY	15.00%					\$28,653
BOND	3.00%					\$5,731
PROFIT	10.00%					\$19,102
JOB TOTAL						\$244,506

=====
Estimate: BLDG 1138 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1175	\$94,766	\$22,935	\$0	\$0	\$117,701
U16 ELECTRICAL	50	\$61,227	\$5,776	\$0	\$0	\$67,003
<b>TOTAL</b>	<b>1225</b>	<b>\$155,993</b>	<b>\$28,711</b>	<b>\$0</b>	<b>\$0</b>	<b>\$184,704</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$6,316			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$155,993</b>	<b>\$35,027</b>		<b>\$0</b>	<b>\$0</b>	<b>\$191,020</b>
CONTINGENCY	15.00%					\$28,653
BOND	3.00%					\$5,731
PROFIT	10.00%					\$19,102
<b>JOB TOTAL</b>						<b>\$244,506</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: ECO6  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1549  
 ANALYSIS DATE: 01-16-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 28118.
B. SIOH	\$ 1406.
C. DESIGN COST	\$ 1406.
D. TOTAL COST (1A+1B+1C)	\$ 30930.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 30930.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	10.	\$ 350.	15.08	\$ 5270.
B. DIST	\$ 19.18	2.	\$ 38.	18.57	\$ 712.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		12.	\$ 388.		\$ 5983.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A)	14.88	\$ 0.
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 0.

B. NON RECURRING SAVINGS (+) / COSTS (-)

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. FUTURE RENOVATIONS	\$ 28110.	10	.74	20801.
d. TOTAL	\$ 28110.			20801.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4) \$ 20801.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 1793.

5. SIMPLE PAYBACK PERIOD (1G/4) 17.25 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 26784.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = .87  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

1549.SIM 12 28 94 Page 1  
FI BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA DOE-2.1C 12/22/1994 14: 3:29 PDL RUN 1  
BUILDING 2-1549 BASE CASE PRESENT ENERGY USAGE  
PORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

**CATEGORY OF USE**

SPACE HEAT	102.49	3805.53
SPACE COOL	0.00	0.00
HVAC AUX	52.17	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.50	0.00
VERT TRNS	0.00	0.00
MISC EQUIP	94.60	0.00
<hr/>	<hr/>	<hr/>
TOTAL	910.77	3805.53

TOTAL SITE ENERGY 4716.32 MBTU 205.1 KBTU/SQFT-YR GROSS-AREA 205.1 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6540.62 MBTU 284.4 KBTU/SQFT-YR GROSS-AREA 284.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 2-1549

HISTORIC RED BRICK BLDG AREA  
ECO-6

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 12/22/1994 14: 3:29 PDL RUN 1

HVAC RENOVATIONS

WEATHER FILE- TMY RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	192.37	3803.76
SPACE COOL	0.00	0.00
HVAC AUX	52.17	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	661.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	94.60	0.00
	-----	-----
TOTAL	900.65	3803.76

TOTAL SITE ENERGY	4716.32 MBTU	205.1 KBTU/SQFT-YR GROSS-AREA	205.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6540.62 MBTU	284.4 KBTU/SQFT-YR GROSS-AREA	284.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 43.5  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

13-Jan-95

MeansData for Lotus

Page 1

=====  
Estimate: BLDG 1549 ECO6 Date: 03-Jan-95

Description: HVAC RENOVATION

Project: LIMITED EEAP(RDBRKBid Date:

Location: FORT BRAGG, N.C. Job #: 94013.05

Sq. footage: 30000 City indx:Raleigh, NC  
=====

Line # Description

	Manhours	Matl	Labor	Equipment	Sub	Total
0913100280						
	ROOFTOP HVAC POWER FEEDER INSTALLATION, INCLUDING					
	CONDUIT AND WIRE, 200 AMPERES				450.00 L.F.	
Unit values	0.31	9.45	6.71	0.00	0.00	16.16
Totals	137.70	\$4,250	\$3,020	\$0	\$0	\$7,270
A09 ELECTRICAL	138	\$4,250	\$3,020	\$0	\$0	\$7,270

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1571801120	ROOFTOP HVAC, SINGLE ZONE, 4 TON COOL, 95 MBH GAS HEAT 1.00 Ea.					
Unit values	14.55	3821.18	223.85	0.00	0.00	4045.03
Totals	14.55	\$3,821	\$224	\$0	\$0	\$4,045
1571801140	ROOFTOP HVAC, SINGLE ZONE, 5 TON COOL, 112 MBH GAS HEAT 1.00 Ea.					
Unit values	28.57	3946.05	441.65	0.00	0.00	4387.70
Totals	28.57	\$3,946	\$442	\$0	\$0	\$4,388
1572500560	AC&V DUCTWORK GALV STL 1000 TO 2000 LB 1900.00 Lb.					
Unit values	0.09	0.46	1.40	0.00	0.00	1.86
Totals	172.90	\$873	\$2,655	\$0	\$0	\$3,528
1572501560	AC&V FLX DCT COATED FIBERGLASS FABRIC ON METAL HELIX NO INSUL 6" DIA 100.00 L.F.					
Unit values	0.06	1.03	0.85	0.00	0.00	1.88
Totals	5.70	\$103	\$85	\$0	\$0	\$188
1574205220	ELECTRIC THERMOSTAT WITH COVER AND WIRING 6.00 Ea.					
Unit values	1.00	74.93	20.81	0.00	0.00	95.74
Totals	6.00	\$450	\$125	\$0	\$0	\$575
1574502020	AC&V DIFFUSRS AL TBAR24X24LAYIN 9X9 12.00 Ea.					
Unit values	0.57	58.44	9.47	0.00	0.00	67.91
Totals	6.85	\$701	\$114	\$0	\$0	\$815
1574601040	AC&V GRILLES AIR RETURNS 14 "X6" 6.00 Ea.					
Unit values	0.35	11.19	5.75	0.00	0.00	16.94
Totals	2.09	\$67	\$34	\$0	\$0	\$101
U15 MECHANICAL	237	\$9,961	\$3,679	\$0	\$0	\$13,640

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1633600400	SAFETY SW FU GEN DUTY 240V 3P 200A FOR ROOFTOP HVAC UNITS				2.00 Ea.	
Unit values	6.15	263.91	95.32	0.00	0.00	359.23
Totals	12.31	\$528	\$191	\$0	\$0	\$719
U16 ELECTRICAL	13	\$528	\$191	\$0	\$0	\$719

=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	388	\$14,739	\$6,890	\$0	\$0	\$21,629
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	0.00%		\$0			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	0.00%				\$0	
TOTAL BEFORE CONTINGENC		\$14,739	\$6,890	\$0	\$0	\$21,629
CONTINGENCY	20.00%					\$4,326
BOND	0.00%					\$0
PROFIT	10.00%					\$2,163
JOB TOTAL						\$28,118

=====
Estimate: BLDG 1549 ECO6 Date: 03-Jan-95
Description: HVAC RENOVATION
Project: LIMITED EEAP(RDBRKBid Date:
Location: FORT BRAGG, N.C. Job #: 94013.05
Sq. footage: 30000 City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
A09 ELECTRICAL	138	\$4,250	\$3,020	\$0	\$0	\$7,270
U15 MECHANICAL	237	\$9,961	\$3,679	\$0	\$0	\$13,640
U16 ELECTRICAL	13	\$528	\$191	\$0	\$0	\$719
<b>TOTAL</b>	<b>388</b>	<b>\$14,739</b>	<b>\$6,890</b>	<b>\$0</b>	<b>\$0</b>	<b>\$21,629</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	0.00%		\$0			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	0.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$14,739</b>	<b>\$6,890</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$21,629</b>
CONTINGENCY	20.00%					\$4,326
BOND	0.00%					\$0
PROFIT	10.00%					\$2,163
<b>JOB TOTAL</b>						<b>\$28,118</b>

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
 FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1728  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

STUDY: ECO6  
 LCCID FY95 (92)

1. INVESTMENT

A. CONSTRUCTION COST	\$ 244506.
B. SIOH	\$ 12225.
C. DESIGN COST	\$ 12225.
D. TOTAL COST (1A+1B+1C)	\$ 268956.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 268956.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994					
FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	62.	\$ 2152.	15.08	\$ 32455.
B. DIST	\$ 19.18	692.	\$ 13275.	18.57	\$ 246521.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		754.	\$ 15427.		\$ 278977.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)					\$ 1000.
(1) DISCOUNT FACTOR (TABLE A)				14.88	
(2) DISCOUNTED SAVING/COST (3A X 3A1)					\$ 14880.
B. NON RECURRING SAVINGS (+) / COSTS (-)					
ITEM	SAVINGS (+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+)/ COST (-) (4)	
1. FUTURE RENOVATIONS	\$ 244506.	10	.74	180934.	
d. TOTAL	\$ 244506.			180934.	
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4)	\$ 195814.				
4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))	\$ 28653.				
5. SIMPLE PAYBACK PERIOD (1G/4)				9.39 YEARS	
6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)	\$ 474791.				
7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= (IF < 1 PROJECT DOES NOT QUALIFY)				1.77	
8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):				5.97 %	

FT BRAGG ENERGY STUDY  
BUILDING 2-1728  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 14:42:13 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

1728.SIM

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	133.98	3035.71
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
	-----	-----
TOTAL	5363.14	3035.71

TOTAL SITE ENERGY 8398.77 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 19140.97 MBTU 255.8 KBTU/SQFT-YR GROSS-AREA 255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1728EC06.SIM

1/12/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1728

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-6

DOE-2.1C 1/12/1995

11:33:55 PDL RUN 1

HVAC RENOVATIONS

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	34.87	673.43
SPACE COOL	1335.50	0.00
HVAC AUX	1115.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.30	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
	-----	-----
TOTAL	5152.98	673.43

TOTAL SITE ENERGY      5826.29 MBTU      77.9 KBTU/SQFT-YR GROSS-AREA      77.9 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    16147.48 MBTU    215.8 KBTU/SQFT-YR GROSS-AREA    215.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

=====
Estimate: BLDG 1728 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1556513060		HTGINSL DUK BLKT 1"FGS 1.5#DENSE			3000.00 S.F.	
Unit values	0.05	0.50	0.67	0.00	0.00	1.17
Totals	138.00	\$1,499	\$2,015	\$0	\$0	\$3,514
1571251550	CENTRAL STATION CHILLED WATER AHU 10,000 CFM MODULAR				4.00 Ea.	
Unit values	44.44	4970.03	710.88	0.00	0.00	5680.90
Totals	177.78	\$19,880	\$2,844	\$0	\$0	\$22,724
1571900600	AC&V WTR CHL RECPG AIR COOL 100 TON				1.00 Ea.	
Unit values	320.00	44955.00	5233.25	0.00	0.00	50188.25
Totals	320.00	\$44,955	\$5,233	\$0	\$0	\$50,188
1572010390	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 24" X 72"				4.00 Ea.	
Unit values	12.03	689.31	184.53	0.00	0.00	873.84
Totals	48.12	\$2,757	\$738	\$0	\$0	\$3,495
1572010430	COIL WATER/CONDENSER 3/8" COP TUBE AL FIN 2ROWX8FIN 30" X 84"				4.00 Ea.	
Unit values	17.78	844.16	275.28	0.00	0.00	1119.43
Totals	71.11	\$3,377	\$1,101	\$0	\$0	\$4,478
1572500580	Galv. steel rectangular duct, incl. ftngs., hangers, over 5,000 lb.				5000.00 Lb.	
Unit values	0.08	0.36	1.30	0.00	0.00	1.66
Totals	420.00	\$1,798	\$6,504	\$0	\$0	\$8,302
1574200001	VAV CONTROL PAKAGE - DDC				1.00 LOT	
Unit values	0.00	12500.00	2500.00	0.00	0.00	15000.00
Totals	0.00	\$12,500	\$2,500	\$0	\$0	\$15,000
1574200003	VARIABLE SPEED DRIVE 15 HP				4.00 EA	
Unit values	0.00	2000.00	500.00	0.00	0.00	2500.00
Totals	0.00	\$8,000	\$2,000	\$0	\$0	\$10,000

12-Jan-95

MeansData for Lotus

Page 2

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1175	\$94,766	\$22,935		\$0	\$0	\$117,701
1681303700	VAV BOXES 800 CFM				50.00 EA		
Unit values	0.00	1200.00	100.00	0.00	0.00	1300.00	
Totals	0.00	\$60,000	\$5,000	\$0	\$0	\$65,000	
1681303800	ELEC THERMOSTAT LINE				50.00 Ea.		
Unit values	1.00	24.54	15.51	0.00	0.00	40.05	
Totals	50.00	\$1,227	\$776	\$0	\$0	\$2,003	
U16 ELECTRICAL	50	\$61,227	\$5,776		\$0	\$0	\$67,003

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	1225	\$155,993	\$28,711		\$0	\$184,704
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$6,316			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$155,993		\$35,027		\$0	\$191,020
CONTINGENCY	15.00%					\$28,653
BOND	3.00%					\$5,731
PROFIT	10.00%					\$19,102
JOB TOTAL						\$244,506

=====
Estimate: BLDG 1728 ECO-6 Date: 22-Dec-94
Description: HVAC RENOVATIONS
Project: ECIP / FEMP Bid Date:
Location: FORT BRAGG NC Job #: 94013.05
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	1175	\$94,766	\$22,935	\$0	\$0	\$117,701
U16 ELECTRICAL	50	\$61,227	\$5,776	\$0	\$0	\$67,003
<b>TOTAL</b>	<b>1225</b>	<b>\$155,993</b>	<b>\$28,711</b>	<b>\$0</b>	<b>\$0</b>	<b>\$184,704</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$6,316			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC	\$155,993	\$35,027		\$0	\$0	\$191,020
CONTINGENCY	15.00%					\$28,653
BOND	3.00%					\$5,731
PROFIT	10.00%					\$19,102
<b>JOB TOTAL</b>						<b>\$244,506</b>

## LIFE CYCLE COST ANALYSIS SUMMARY

### **STUDY: ECO6**

LCCID FY95 (92)

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID FY95 (92)  
INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
PROJECT NO. & TITLE: 94013.05 ECO 6 : HVAC RENOVATIONS  
FISCAL YEAR 95 DISCRETE PORTION NAME: BUILDING 2-1731  
ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

## 1. INVESTMENT

A. CONSTRUCTION COST	\$	71002.
B. SIOH	\$	3550.
C. DESIGN COST	\$	3550.
D. TOTAL COST (1A+1B+1C)	\$	78102.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.
F. PUBLIC UTILITY COMPANY REBATE	\$	0.
G. TOTAL INVESTMENT (1D - 1E - 1F)		

## 2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	25.	\$ 880.	15.08	\$ 13266.
B. DIST	\$ 19.18	13.	\$ 240.	18.57	\$ 4459.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		38.	\$ 1120.		\$ 17725.

### 3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)

(1) DISCOUNT FACTOR (TABLE A) 14.88  
(2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 14880.

**B. NON RECURRING SAVINGS (+) / COSTS (-)**

ITEM	SAVINGS (+) COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
RENOVATIONS	\$ 71002.	10	.74	52541.
	\$ 71002.			52541

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3BD4) \$ 674.21

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3BD1/(YRS ECONOMIC LIFE)) \$ 5670

## 5. SIMPLE PAYBACK PERIOD (1G/4)

#### 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)

7. SAVINGS TO INVESTMENT RATIO (SIR) - (6 / 1G) - 1.00

\*\*\*\*\* Project does not qualify for ECIP funding: 4 5 6 for information only

#### 8 ADJUSTED INTERNAL RATE OF RETURN (AIRR)

N/A

FT BRAGG ENERGY STUDY  
 BUILDING 2-1731 PART A (FIRST SECTION) BASE CASE  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995 15:17: 2 PDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1965.15	764.80

TOTAL SITE ENERGY	2729.95 MBTU	123.9 KBTU/SQFT-YR GROSS-AREA	123.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6666.15 MBTU	302.5 KBTU/SQFT-YR GROSS-AREA	302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY HISTORIC RED BRICK BLDG AREA 1731B.SIM  
BUILDING 2-1731 PART B (SECOND SECTION) BASE CASE DOE-2.1C 1/ 6/1995 15:36:40 PDL RUN 1  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
	-----	-----
TOTAL	1911.12	601.04

TOTAL SITE ENERGY 2512.19 MBTU 109.8 KBTU/SQFT-YR GROSS-AREA 109.8 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6340.23 MBTU 277.0 KBTU/SQFT-YR GROSS-AREA 277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

T BRAGG ENERGY STUDY  
 BUILDING 2-1731 PART C (THIRD SECTION)  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 6/1995 15:58:56 PDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	32.17	621.20
SPACE COOL	601.67	0.00
HVAC AUX	402.21	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
	-----	-----
<b>TOTAL</b>	<b>1911.79</b>	<b>621.20</b>

TOTAL SITE ENERGY 2532.99 MBTU 110.7 KBTU/SQFT-YR GROSS-AREA 110.7 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6362.32 MBTU 278.0 KBTU/SQFT-YR GROSS-AREA 278.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1731AEC6.SIM

1/12/95

Page 1

FT BRAGG ENERGY STUDY

BUILDING 2-1731 PART A (FIRST SECTION) ECO-6

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/12/1995

9:58:43 PDL RUN 1

HVAC RENOVATIONS

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	567.25	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1934.92	764.80

TOTAL SITE ENERGY 2699.73 MBTU 122.5 KBTU/SQFT-YR GROSS-AREA 122.5 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6575.40 MBTU 298.3 KBTU/SQFT-YR GROSS-AREA 298.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	566.28	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.41	0.00
	-----	-----
TOTAL	1878.83	601.04

TOTAL SITE ENERGY 2479.90 MBTU 108.4 KBTU/SQFT-YR GROSS-AREA 108.4 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6243.28 MBTU 272.8 KBTU/SQFT-YR GROSS-AREA 272.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1731CEC6.SIM

1/12/95

Page 1

FT BRAGG ENERGY STUDY

BUILDING 2-1731 PART C (THIRD SECTION) ECO-6

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/12/1995

10: 6:49 PDL RUN 1

HVAC RENOVATIONS

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	29.95	578.47
SPACE COOL	569.10	0.00
HVAC AUX	413.62	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
	-----	-----
TOTAL	1888.41	578.47

TOTAL SITE ENERGY 2466.89 MBTU 107.8 KBTU/SQFT-YR GROSS-AREA 107.8 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6249.40 MBTU 273.1 KBTU/SQFT-YR GROSS-AREA 273.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

13-Jan-95

MeansData for Lotus

Page 1

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 Estimate: BLDG 1731 ECO-6 Date: 22-Dec-94
 Description: HVAC RENOVATIONS
 Project: ECIP / FEMP Bid Date:
 Location: FORT BRAGG NC Job #: 94013.05
 Sq. footage: City indx:Raleigh, NC
 =====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
1517012110	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM					50.00	L.F.
Unit values	0.43	9.44	6.66	0.83	0.00	16.93	
Totals	21.60	\$472	\$333	\$42	\$0	\$847	
1556515380	PIPE CVR CALSIL W/CVR 1.5" WL 4" PIPE					50.00	L.F.
Unit values	0.13	3.05	1.88	0.00	0.00	4.92	
Totals	6.40	\$152	\$94	\$0	\$0	\$246	
1571901200	AC&V WTR CHLRS RECPRCTG WTR COOLED MULTIPLE COMPRES.SEMI-HERM.140 TON					1.00	Ea.
Unit values	355.00	46853.10	5808.00	344.85	0.00	53005.95	
Totals	355.00	\$46,853	\$5,808	\$345	\$0	\$53,006	
U15 MECHANICAL		383	\$47,477	\$6,235	\$387	\$0	\$54,099

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL		383	\$47,477	\$6,235	\$387	\$0	\$54,099
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$1,372			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$47,477		\$7,607		\$0	\$55,471
CONTINGENCY	15.00%						\$8,321
BOND	3.00%						\$1,664
PROFIT	10.00%						\$5,547
JOB TOTAL							\$71,002

13-Jan-95

MeansData for Lotus

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=====
 Estimate: BLDG 1731 ECO-6 Date: 22-Dec-94
 Description: HVAC RENOVATIONS
 Project: ECIP / FEMP Bid Date:
 Location: FORT BRAGG NC Job #: 94013.05
 Sq. footage: City indx:Raleigh, NC
 =====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	383	\$47,477	\$6,235	\$387	\$0	\$54,099
TOTAL	383	\$47,477	\$6,235	\$387	\$0	\$54,099
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$1,372			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
TOTAL BEFORE CONTINGENC		\$47,477	\$7,607	\$387	\$0	\$55,471
CONTINGENCY	15.00%					\$8,321
BOND	3.00%					\$1,664
PROFIT	10.00%					\$5,547
JOB TOTAL						\$71,002

## 12 ECO - 7 CALCULATIONS

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

This section contains the life-cycle cost analyses, energy calculations, and cost estimates for ECO-7: Install Central Chilled Water Plant. The energy savings from each building proposed to be connected to the central plant was combined to form one total energy savings figure.

A single life-cycle cost analysis and cost estimate was performed for this ECO.

## **12 ECO - 7 CALCULATIONS**

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

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**LIFE - CYCLE  
COST  
ANALYSIS  
SUMMARY**

LIFE CYCLE COST ANALYSIS SUMMARY  
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)  
 STUDY: ECO7  
 LCCID FY95 (92)  
 INSTALLATION & LOCATION: FORT BRAGG REGION NOS. 4 CENSUS: 3  
 PROJECT NO. & TITLE: 94013.05 EOC 7 : CENTRAL CHILLED WATER PLANT  
 FISCAL YEAR 95 DISCRETE PORTION NAME: CENTRAL CHILL WATER  
 ANALYSIS DATE: 01-13-95 ECONOMIC LIFE 20 YEARS PREPARED BY: GREEN

1. INVESTMENT

A. CONSTRUCTION COST	\$ 1290693.
B. SIOH	\$ 64535.
C. DESIGN COST	\$ 64535.
D. TOTAL COST (1A+1B+1C)	\$ 1419763.
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$ 0.
F. PUBLIC UTILITY COMPANY REBATE	\$ 0.
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$ 1419763.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/ MWH(1)	SAVINGS MWH/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 34.95	724.	\$ 25293.	15.08	\$ 381418.
B. DIST	\$ .00	0.	\$ 0.	18.57	\$ 0.
C. RESID	\$ .00	0.	\$ 0.	21.02	\$ 0.
D. NAT G	\$ 13.45	0.	\$ 0.	18.58	\$ 0.
E. COAL	\$ .00	0.	\$ 0.	16.83	\$ 0.
F. PPG	\$ .00	0.	\$ 0.	17.38	\$ 0.
M. DEMAND SAVINGS			\$ 0.	14.88	\$ 0.
N. TOTAL		724.	\$ 25293.		\$ 381418.

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$ 9000.
(1) DISCOUNT FACTOR (TABLE A)	14.88
(2) DISCOUNTED SAVING/COST (3A X 3A1)	\$ 133920.

B. NON RECURRING SAVINGS (+) / COSTS (-)	SAVINGS (+) ITEM	COST (-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS (+) / COST (-) (4)
1. CHILLER REPLACEMENT	\$ 225000.	.10	.74		166500.
d. TOTAL	\$ 225000.				166500.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST (-) (3A2+3Bd4) \$ 300420.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE)) \$ 45543.

5. SIMPLE PAYBACK PERIOD (1G/4) 31.17 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 681838.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= .48  
 (IF < 1 PROJECT DOES NOT QUALIFY)

\*\*\*\* Project does not qualify for ECIP funding; 4,5,6 for information only.

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): N/A

**BUILDING  
CALCULATIONS**

1242.SIM

1/10/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 9/1995

14: 2: 8 PDL RUN 1

BUILDING 1242

BASE CASE

PRESENT ENERGY USAGE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
-----		
TOTAL	1613.84	1328.59

TOTAL SITE ENERGY 3048.69 MBTU 158.5 KBTU/SQFT-YR GROSS-AREA 158.5 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6494.06 MBTU 337.5 KBTU/SQFT-YR GROSS-AREA 337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1242EC07.SIM

1/11/95

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FT BRAGG ENERGY STUDY  
 BUILDING 1242  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
 ECO-7

DOE-2.1C 1/10/1995 17:10:15 PDL RUN 1  
 CENTRAL CW PLANT  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	274.67	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
<hr/>		
TOTAL	1577.81	1328.59

TOTAL SITE ENERGY	3012.67 MBTU	156.6 KBTU/SQFT-YR GROSS-AREA	156.6 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6385.87 MBTU	331.9 KBTU/SQFT-YR GROSS-AREA	331.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 1-1326 HQ BLDG  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 1/ 6/1995 14:16:42 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	285.53	5085.34
SPACE COOL	1748.59	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.17	0.00
<hr/>	<hr/>	<hr/>
TOTAL	6248.75	5085.34

TOTAL SITE ENERGY 11333.96 MBTU 192.0 KBTU/SQFT-YR GROSS-AREA 192.0 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 23849.96 MBTU 404.0 KBTU/SQFT-YR GROSS-AREA 404.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1326EC07.SIM

1/11/95

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FT BRAGG ENERGY STUDY

BUILDING 1-1326 HQ BLDG

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-7

DOE-2.1C 1/10/1995

18:59:13 PDL RUN 1

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	285.53	5085.34
SPACE COOL	1070.02	0.00
HVAC AUX	1223.96	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1903.50	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	1087.16	0.00
<hr/>	<hr/>	<hr/>
TOTAL	5570.18	5085.34

TOTAL SITE ENERGY 10655.40 MBTU 180.5 KBTU/SQFT-YR GROSS-AREA 180.5 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 21812.24 MBTU 369.5 KBTU/SQFT-YR GROSS-AREA 369.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 36.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 3/1995 15:32: 6 PDL RUN 1

BUILDING 1-1333

BASE CASE

PRESENT ENERGY USAGE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

## ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	79.52	891.42
------------	-------	--------

SPACE COOL	347.65	0.00
------------	--------	------

HVAC AUX	192.92	0.00
----------	--------	------

DOM HOT WTR	0.00	0.00
-------------	------	------

AUX SOLAR	0.00	0.00
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LIGHTS	303.25	0.00
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VERT TRANS	0.00	0.00
------------	------	------

MISC EQUIP	324.51	0.00
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TOTAL	1247.85	891.42
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TOTAL SITE ENERGY	2139.24 MBTU	162.3 KBTU/SQFT-YR GROSS-AREA	162.3 KBTU/SQFT-YR NET-AREA
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TOTAL SOURCE ENERGY	4638.62 MBTU	351.9 KBTU/SQFT-YR GROSS-AREA	351.9 KBTU/SQFT-YR NET-AREA
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PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5

PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1333EC07.SIM

1/11/95

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FT BRAGG ENERGY STUDY

BUILDING 1-1333

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-7

DOE-2.1C 1/11/1995

CENTRAL CW PLANT

WEATHER FILE-

7:35:25 PDL RUN 1

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	79.52	891.42
SPACE COOL	347.65	0.00
HVAC AUX	192.92	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	303.25	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	324.51	0.00
	-----	-----
TOTAL	1247.85	891.42

TOTAL SITE ENERGY 2139.24 MBTU 162.3 KBTU/SQFT-YR GROSS-AREA 162.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 4638.62 MBTU 351.9 KBTU/SQFT-YR GROSS-AREA 351.9 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 4.5  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 2-1105  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BUILDING AREA  
BASE CASE

DOE-2.1C 1/4/1995  
PRESENT ENERGY USAGE

9:10:45 PDL RUN 1  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	230.21	4552.14
SPACE COOL	1267.76	0.00
HVAC AUX	1808.60	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	3329.45	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	412.70	0.00
	-----	-----
TOTAL	7048.73	4552.14

TOTAL SITE ENERGY	11601.09 MBTU	157.0 KBTU/SQFT-YR GROSS-AREA	157.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	25720.15 MBTU	348.0 KBTU/SQFT-YR GROSS-AREA	348.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.1

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1105EC07.SIM

1/11/95

Page 1

FT BRAGG ENERGY STUDY  
BUILDING 2-1105HISTORIC RED BRICK BUILDING AREA  
ECO-7

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/10/1995 16:27:59 PDL RUN 1  
CENTRAL CW PLANT  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	230.21	4552.14
SPACE COOL	929.12	0.00
HVAC AUX	1808.60	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	3329.45	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	412.70	0.00
	-----	-----
TOTAL	6710.09	4552.14

TOTAL SITE ENERGY 11262.45 MBTU 152.4 KBTU/SQFT-YR GROSS-AREA 152.4 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 24703.21 MBTU 334.2 KBTU/SQFT-YR GROSS-AREA 334.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.0  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 2-1120  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
ESTIMATED BUILDING ENERGY PERFORMANCE

DOE-2.1C 1/ 6/1995 9:26: 7 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

1120.SIM

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	984.55	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
-----		
TOTAL	3885.73	4735.99

TOTAL SITE ENERGY 8621.56 MBTU 116.2 KBTU/SQFT-YR GROSS-AREA 116.2 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 16404.38 MBTU 221.1 KBTU/SQFT-YR GROSS-AREA 221.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1120EC07.SIM

1/11/95

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HISTORIC RED BRICK BLDG AREA

ECO-7

DOE-2.1C 1/11/1995

11:23:12 PDL RUN 1

FT BRAGG ENERGY STUDY

BUILDING 2-1120

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	181.42	4735.99
SPACE COOL	688.50	0.00
HVAC AUX	337.24	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1706.99	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	675.53	0.00
	-----	-----
TOTAL	3589.69	4735.99

TOTAL SITE ENERGY 8325.51 MBTU 112.2 KBTU/SQFT-YR GROSS-AREA 112.2 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 15515.35 MBTU 209.1 KBTU/SQFT-YR GROSS-AREA 209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.8  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1127.SIM

12 28 94

Page 1

FT BRAGG ENERGY STUDY  
 BUILDING 2-1127  
 PORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BUILDING AREA  
 BASE CASE

DOE-2.1C 12/22/1994 8:24:33 PDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	178.99	3457.19
SPACE COOL	1433.37	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
	-----	-----
TOTAL	4799.69	3457.19

TOTAL SITE ENERGY 8256.87 MBTU 142.9 KBTU/SQFT-YR GROSS-AREA 142.9 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 17870.65 MBTU 309.2 KBTU/SQFT-YR GROSS-AREA 309.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1127EC07.SIM

1/11/95

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FT BRAGG ENERGY STUDY  
 BUILDING 2-1127  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BUILDING AREA  
 ECO-7

DOE-2.1C 1/10/1995 16:40:10 PDL RUN 1  
 CENTRAL CW PLANT  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	178.99	3457.19
SPACE COOL	969.79	0.00
HVAC AUX	1108.49	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1512.83	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	566.01	0.00
<hr/>		
TOTAL	4336.11	3457.19

TOTAL SITE ENERGY 7793.29 MBTU 134.8 KBTU/SQFT-YR GROSS-AREA 134.8 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 16478.51 MBTU 285.1 KBTU/SQFT-YR GROSS-AREA 285.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 48.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 1.3

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
BUILDING 1-1138  
REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART A (FIRST FLOOR)

1138A.SIM  
DOE-2.1C 12/28/1994 10:15:52 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

CATEGORY OF USE

SPACE HEAT	398.05	1053.81
SPACE COOL	344.03	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1907.21	1053.81

TOTAL SITE ENERGY 2961.09 MBTU 91.3 KBTU/SQFT-YR GROSS-AREA 91.3 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 6781.38 MBTU 209.1 KBTU/SQFT-YR GROSS-AREA 209.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

11388.SIM

1/10/95

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FT BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE PART B (SECOND FLOOR)

DOE-2.1C 1/ 9/1995

14:13:37 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.62	873.22
SPACE COOL	489.12	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.40	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
	-----	-----
TOTAL	2263.21	873.22

TOTAL SITE ENERGY 3136.42 MBTU 165.3 KBTU/SQFT-YR GROSS-AREA 165.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 7669.62 MBTU 404.1 KBTU/SQFT-YR GROSS-AREA 404.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE PART C (THIRD FLOOR)

DOE-2.1C 1/ 9/1995

PRESENT ENERGY USAGE

WEATHER FILE-

14:58:48 PDL RUN 1

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	63.02	1901.29
SPACE COOL	324.06	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.34	0.00
<hr/>		
TOTAL	2174.70	1901.29

TOTAL SITE ENERGY    4076.03 MBTU    214.8 KBTU/SQFT-YR GROSS-AREA    214.8 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY    8432.04 MBTU    444.3 KBTU/SQFT-YR GROSS-AREA    444.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138AEC7.SIM

1/11/95

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FT BRAGG ENERGY STUDY  
 BUILDING 1-1138  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
 ECO-7 PART A (FIRST FLOOR)

DOE-2.1C 1/10/1995 16:44:37 PDL RUN 1  
 CENTRAL CW PLANT  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	398.05	1053.81
SPACE COOL	282.73	0.00
HVAC AUX	373.27	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	466.41	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	325.45	0.00
	-----	-----
TOTAL	1845.91	1053.81

TOTAL SITE ENERGY 2899.79 MBTU 89.4 KBTU/SQFT-YR GROSS-AREA 89.4 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6597.30 MBTU 203.4 KBTU/SQFT-YR GROSS-AREA 203.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.1  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138BEC7.SIM

1/11/95

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FT BRAGG ENERGY STUDY

BUILDING 1-1138

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-7 PART B (SECOND FLOOR)

DOE-2.1C 1/10/1995

17:14: 2 PDL RUN 1

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY      FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.62	873.22
SPACE COOL	351.33	0.00
HVAC AUX	399.71	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.39	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.36	0.00
<hr/>		
TOTAL	2125.40	873.22

TOTAL SITE ENERGY      2998.63 MBTU      158.0 KBTU/SQFT-YR GROSS-AREA      158.0 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY      7255.83 MBTU      382.3 KBTU/SQFT-YR GROSS-AREA      382.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 3.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

1138CEC7.SIM

1/11/95

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FT BRAGG ENERGY STUDY  
 BUILDING 1-1138  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
 ECO-7 PART C (THIRD FLOOR)

DOE-2.1C 1/10/1995 17:11:44 PDL RUN 1  
 CENTRAL CW PLANT  
 WEATHER FILE- RALEIGH, NC

**ENERGY TYPE**  
**IN SITE MBTU - ELECTRICITY      FUEL-OIL**

**CATEGORY OF USE**

SPACE HEAT	63.02	1901.29
SPACE COOL	254.85	0.00
HVAC AUX	453.90	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	664.37	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	669.33	0.00
-----		
TOTAL	2105.48	1901.29

TOTAL SITE ENERGY	4006.82 MBTU	211.1 KBTU/SQFT-YR GROSS-AREA	211.1 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	8224.21 MBTU	433.3 KBTU/SQFT-YR GROSS-AREA	433.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.6  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

BUILDING 2-1728

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 1/ 6/1995

14:42:13 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

**ENERGY TYPE**  
**IN SITE MBTU - ELECTRICITY FUEL-OIL**

**CATEGORY OF USE**

SPACE HEAT	133.98	3035.71
SPACE COOL	1096.12	0.00
HVAC AUX	1466.37	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.31	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.36	0.00
<hr/>		
TOTAL	5363.14	3035.71

TOTAL SITE ENERGY 8398.77 MBTU 112.3 KBTU/SQFT-YR GROSS-AREA 112.3 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 19140.97 MBTU 255.8 KBTU/SQFT-YR GROSS-AREA 255.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

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1/11/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1728

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

ECO-7

DOE-2.1C 1/11/1995

7:42:15 PDL RUN 1

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	133.98	3035.71
SPACE COOL	745.81	0.00
HVAC AUX	1466.35	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	1672.29	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	994.35	0.00
	-----	-----
TOTAL	5012.78	3035.71

TOTAL SITE ENERGY 8048.46 MBTU 107.6 KBTU/SQFT-YR GROSS-AREA 107.6 KBTU/SQFT-YR NET-AREA  
TOTAL SOURCE ENERGY 18089.01 MBTU 241.8 KBTU/SQFT-YR GROSS-AREA 241.8 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 2.4  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995

15:17: 2 PDL RUN 1

BUILDING 2-1731 PART A (FIRST SECTION) BASE CASE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

## ENERGY TYPE

IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	597.47	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
<hr/>		<hr/>
TOTAL	1965.15	764.80

TOTAL SITE ENERGY	2729.95 MBTU	123.9 KBTU/SQFT-YR GROSS-AREA	123.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6666.15 MBTU	302.5 KBTU/SQFT-YR GROSS-AREA	302.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995

15:36:40 PDL RUN 1

BUILDING 2-1731 PART B (SECOND SECTION) BASE CASE

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

PRESENT ENERGY USAGE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	598.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
<hr/>		
TOTAL	1911.12	601.04

TOTAL SITE ENERGY	2512.19 MBTU	109.8 KBTU/SQFT-YR GROSS-AREA	109.8 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6340.23 MBTU	277.0 KBTU/SQFT-YR GROSS-AREA	277.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY  
 BUILDING 2-1731 PART C (THIRD SECTION) BASE CASE  
 REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/ 6/1995 15:58:56 PDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	32.17	621.20
SPACE COOL	601.67	0.00
HVAC AUX	402.21	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
	-----	-----
TOTAL	1911.79	621.20

TOTAL SITE ENERGY 2532.99 MBTU 110.7 KBTU/SQFT-YR GROSS-AREA 110.7 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6362.32 MBTU 278.0 KBTU/SQFT-YR GROSS-AREA 278.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/11/1995

9:22:51 PDL RUN 1

BUILDING 2-1731 PART A (FIRST SECTION) ECO-7

CENTRAL CW PLANT

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	40.00	764.80
SPACE COOL	603.25	0.00
HVAC AUX	159.66	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	737.12	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	430.90	0.00
	-----	-----
TOTAL	1970.92	764.80

TOTAL SITE ENERGY 2735.73 MBTU 124.1 KBTU/SQFT-YR GROSS-AREA 124.1 KBTU/SQFT-YR NET-AREA  
 TOTAL SOURCE ENERGY 6683.49 MBTU 303.2 KBTU/SQFT-YR GROSS-AREA 303.2 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 9.7  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

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1/11/95

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FT BRAGG ENERGY STUDY

BUILDING 2-1731 PART B (SECOND SECTION) ECO-7

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/11/1995

7:41:23 PDL RUN 1

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	31.12	601.04
SPACE COOL	571.57	0.00
HVAC AUX	399.31	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.71	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	312.40	0.00
	-----	-----
TOTAL	1884.12	601.04

TOTAL SITE ENERGY	2485.20 MBTU	108.6 KBTU/SQFT-YR GROSS-AREA	108.6 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6259.18 MBTU	273.5 KBTU/SQFT-YR GROSS-AREA	273.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.4  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

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1/11/95

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FT BRAGG ENERGY STUDY

HISTORIC RED BRICK BLDG AREA

DOE-2.1C 1/11/1995

7:50:55 PDL RUN 1

BUILDING 2-1731 PART C (THIRD SECTION) ECO-7

REPORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

CENTRAL CW PLANT

WEATHER FILE-

RALEIGH, NC

ENERGY TYPE  
 IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	29.95	578.47
SPACE COOL	572.51	0.00
HVAC AUX	413.62	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	569.72	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	306.02	0.00
	-----	-----
TOTAL	1891.83	578.47

TOTAL SITE ENERGY	2470.30 MBTU	107.9 KBTU/SQFT-YR GROSS-AREA	107.9 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6259.66 MBTU	273.5 KBTU/SQFT-YR GROSS-AREA	273.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 8.3  
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
 ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

**COST  
ESTIMATE**

13-Jan-95

MeansData for Lotus

Page 1

=====  
Estimate: ECO-7 Date: 22-Dec-94  
Description: CENTRAL CHILLED WATER PLANT  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC  
=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0001000000	CONSTRUCT A 1250 FT^2 BUILDING FOR THE CHILLER PLANT INCLUDS LABOR					1.00 EA	
Unit values		0.00	35000.00	0.00	0.00	0.00	35000.00
Totals		0.00	\$35,000	\$0	\$0	\$0	\$35,000
U00		0	\$35,000	\$0	\$0	\$0	\$35,000

=====

Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
0222580700	EXCAV UTIL TRNCH COMMON EARTH, CHAIN TRNCHR 12HP OPERWLKG 8"W 24"DP					3000.00	L.F.
Unit values		0.02	0.00	0.45	0.20	0.00	0.65
Totals		69.00	\$0	\$1,353	\$587	\$0	\$1,940
0251040460	ASPHALTIC CONCRETE PAVEMENT, PAVING, BINDER COURSE, 3" THICK					3000.00	S.Y.
Unit values		0.02	4.35	0.35	0.31	0.00	5.02
Totals		60.00	\$13,059	\$1,047	\$945	\$0	\$15,051
U02 SITEWORK		129	\$13,059	\$2,400	\$1,532	\$0	\$16,991

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
1517012110	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 4" DIAM					
Unit values	0.43	9.44	6.66	0.83	0.00	16.93
Totals	518.40	\$11,329	\$7,986	\$1,002	\$0	\$20,317
1517012130	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 6" DIAM					
Unit values	0.67	18.48	10.65	0.86	0.00	29.99
Totals	1334.00	\$36,963	\$21,296	\$1,718	\$0	\$59,977
1517012150	PIPE STEEL SCH 40 WELD JT ROLL HANGER FOR CVRG 10'OC BLK 10" DIAM					
Unit values	1.00	48.95	16.03	1.29	0.00	66.27
Totals	100.00	\$4,895	\$1,603	\$129	\$0	\$6,627
1524105620	PUMP 6" X 25 HP 1550 GPM					
Unit values	17.14	2322.68	275.28	0.00	0.00	2597.95
Totals	68.57	\$9,291	\$1,101	\$0	\$0	\$10,392
1524303140	PMP GENUTL 1STG DBLSUC 5"DX6"S 50HP					
Unit values	72.73	7092.90	1164.63	0.00	0.00	8257.53
Totals	145.45	\$14,186	\$2,329	\$0	\$0	\$16,515
1556516740	PIPE CVR FBGL 1/2"THK ASJ 4" IPS					
Unit values	0.10	1.24	1.46	0.00	0.00	2.70
Totals	120.00	\$1,487	\$1,757	\$0	\$0	\$3,244
1556516760	PIPE CVR FBGL 1/2" THK ASJ 6" IPS					
Unit values	0.13	1.49	1.95	0.00	0.00	3.44
Totals	266.00	\$2,977	\$3,908	\$0	\$0	\$6,885
1556517000	PIPE CVR FBGL 1"THK ASJ 10" IPS					
Unit values	0.18	3.05	2.60	0.00	0.00	5.65
Totals	17.80	\$305	\$260	\$0	\$0	\$565
1571900320	AC&V CHILLR WTRCOOL HERMCENT750TON					
Unit values	0.00	168930.90	32730.50	0.00	0.00	201661.40
Totals	0.00	\$506,793	\$98,192	\$0	\$0	\$604,985
1572402150	COOLING TOWER, INDUCED, GEARED 750TON					
Unit values	0.17	37.96	2.70	0.00	2250.00 TonAC	40.67

13-Jan-95

MeansData for Lotus

Page 4

Totals	380.25	\$85,415	\$6,085	\$0	\$0	\$91,500
1572403500	COOLING TOWER PUMPS & PIPING ADD				2250.00	TonAC
Unit values	0.63	33.47	10.10	0.00	0.00	43.57
Totals	1422.00	\$75,300	\$22,733	\$0	\$0	\$98,033

13-Jan-95

MeansData for Lotus

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Line #	Description	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL		4373	\$748,941	\$167,250	\$2,849	\$0	\$919,040
ESTIMATE TOTAL		4502	\$797,000	\$169,650	\$4,381	\$0	\$971,031
SALES TAX	0.00%		\$0				
MATL MARKUP	0.00%		\$0				
LABOR MARKUP	22.00%			\$37,323			
EQUIPT MARKUP	0.00%				\$0		
SUB MARKUP	5.00%					\$0	
TOTAL BEFORE CONTINGENC		\$797,000	\$206,973	\$4,381		\$0	\$1,008,354
CONTINGENCY	15.00%						\$151,253
BOND	3.00%						\$30,251
PROFIT	10.00%						\$100,835
JOB TOTAL							\$1,290,693

=====
Estimate: ECO-7 Date: 22-Dec-94  
Description: CENTRAL CHILLED WATER PLANT  
Project: ECIP / FEMP Bid Date:  
Location: FORT BRAGG NC Job #: 94013.05  
Sq. footage: City indx:Raleigh, NC
=====

## SUMMARY

	Manhours	Matl	Labor	Equipment	Sub	Total
U00	0	\$35,000	\$0	\$0	\$0	\$35,000
U02 SITEWORK	129	\$13,059	\$2,400	\$1,532	\$0	\$16,991
U15 MECHANICAL	4373	\$748,941	\$167,250	\$2,849	\$0	\$919,040
<b>TOTAL</b>	<b>4502</b>	<b>\$797,000</b>	<b>\$169,650</b>	<b>\$4,381</b>	<b>\$0</b>	<b>\$971,031</b>
SALES TAX	0.00%	\$0				
MATL MARKUP	0.00%	\$0				
LABOR MARKUP	22.00%		\$37,323			
EQUIPT MARKUP	0.00%			\$0		
SUB MARKUP	5.00%				\$0	
<b>TOTAL BEFORE CONTINGENC</b>	<b>\$797,000</b>	<b>\$206,973</b>	<b>\$4,381</b>		<b>\$0</b>	<b>\$1,008,354</b>
CONTINGENCY	15.00%					\$151,253
BOND	3.00%					\$30,251
PROFIT	10.00%					\$100,835
<b>JOB TOTAL</b>						<b>\$1,290,693</b>

## **13 SAMPLE DOE 2 INPUT AND OUTPUT FILES**

*LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC*

The calculations for ECOs 2, 4, 5, 6, and 7 were performed using the DOE Building Simulation program. The DOE program simulates a building's annual energy performance by modeling all energy consuming systems within that building. Heating and cooling loads are calculated on an hourly basis using local weather data. The user inputs criteria such as building envelope materials, lighting and occupant loading, HVAC equipment type and zoning. Details of the user input data and assumptions used in the simulations can be found in *Section 5.3* of the report. This section contains sample DOE input and output files for the baseline run of one building (1242).

## 13 SAMPLE DOE 2 INPUT AND OUTPUT FILES

LIMITED ENERGY STUDY OF HISTORIC RED BRICK AREA, FT. BRAGG, NC

### TABLE OF CONTENTS

SAMPLE DOE 2 INPUT FILE (BUILDING 1242 BASELINE) .....	13-5
SAMPLE DOE 2 OUTPUT FILE (BUILDING 1242 BASELINE) .....	13-11

**SAMPLE DOE 2  
INPUT AND  
OUTPUT FILES  
(BUILDING 1242 BASELINE)**

**SAMPLE DOE 2  
INPUT FILE  
(BUILDING 1242 BASELINE)**

1242.INP 3/16/95 Page 1

INPUT LOADS ..  
TITLE LINE-1 \*FT BRAGG ENERGY STUDY\* ..  
TITLE LINE-2 \*HISTORIC RED BRICK BLDG AREA\* ..  
TITLE LINE-3 \*BUILDING 1242\* ..  
TITLE LINE-4 \*BASE CASE\* ..  
TITLE LINE-5 \*PRESENT ENERGY USAGE\* ..

RUN-PERIOD FROM JAN 1 1994 THRU DEC 31 1994 ..

ABORT ERRORS ..

DIAGNOSTIC COMMENTS NARROW ..

LOADS-REPORT V=(LV-A,LV-B,LV-D,LV-I) S=(LS-A,LS-C,LS-D) ..

BUILDING-LOCATION

D-S=YES AZ=90 T-Z=5 ..

\$CONSTRUCTION INPUTS

WALL = LAYERS MATERIAL=(HF-A7,HF-B1,HF-C7,HF-E1) ..  
ROOF1 = LAYERS MATERIAL=(HF-E2,HF-E3,HF-B2,HF-C14,HF-E4,HF-E5) ..  
WALLBOT = CONS LAYERS=WALL ABS=.88 RO=2 ..  
BUTOOF = CONS LAYERS=ROOF1 ABS=.75 RO=3 ..  
CLEAR = G-T PANES=2 S-C=0.7 ..  
FLOOR = CONS U=.20 ..  
METALDOOR = CONS U=0.59 ..  
INTWALL = CONS U=.40 ..

\$ OCCUPANCY SCHEDULE FOR BILLETED AREAS (KITCHEN,SECOND&THIRD FLOORS)  
OC-DS1 = D-SCH (1,6)(1)(7,17)(.25)(18,24)(1) ..  
OC-WEHDS1 = D-SCH (1,24)(.75) ..  
OC-WS1 = W-SCH (WD) OC-DS1 (WEH) OC-WEHDS1 ..  
OC-SCH1 = SCHEDULE THRU DEC 31 OC-WS1 ..

\$ OCCUPANCY SCHEDULE FOR FIRST FLOOR OFFICES ON FIRST FLOOR  
OC-DS2 = D-SCH (1,6)(0)(7,17)(1)(18,24)(0) ..  
OC-WEHDS2 = D-SCH (1,24)(0) ..  
OC-WS2 = W-SCH (WD) OC-DS2 (WEH) OC-WEHDS2 ..  
OC-SCH2 = SCHEDULE THRU DEC 31 OC-WS2 ..

\$ LIGHTING SCHEDULE FOR BILLETED AREAS  
LT-DS1 = D-SCH (1,5)(.2)(6,7)(1)(8,17)(.25)(18,22)(1)(23,24)(.2) ..  
LT-WEHDS1 = D-SCH (1,24)(.5) ..  
LT-WS1 = W-SCH (WD) LT-DS1 (WEH) LT-WEHDS1 ..  
LT-SCH1 = SCHEDULE THRU DEC 31 LT-WS1 ..

\$ LIGHTING SCHEDULE FOR OFFICE AREAS  
LT-DS2 = D-SCH (1,6)(.1)(7,17)(1)(18,24)(.1) ..  
LT-WEHDS2 = D-SCH (1,24)(.1) ..  
LT-WS2 = W-SCH (WD) LT-DS2 (WEH) LT-WEHDS2 ..  
LT-SCH2 = SCHEDULE THRU DEC 31 LT-WS2 ..

\$ EQUIPMENT SCHEDULE FOR BILLETED AREAS  
EQ-DS1 = D-SCH (1,5)(0)(6,7)(1)(8,17)(.25)(18,22)(1)(23,24)(0) ..  
EQ-WEHDS1 = D-SCH (1,24)(.5) ..  
EQ-WS1 = W-SCH (WD) EQ-DS1 (WEH) EQ-WEHDS1 ..  
EQ-SCH1 = SCHEDULE THRU DEC 31 EQ-WS1 ..

\$ EQUIPMENT SCHEDULE FOR OFFICE AREAS  
EQ-DS2 = D-SCH (1,6)(0)(7,17)(1)(18,24)(0) ..  
EQ-WEHDS2 = D-SCH (1,24)(0) ..  
EQ-WS2 = W-SCH (WD) EQ-DS2 (WEH) EQ-WEHDS2 ..  
EQ-SCH2 = SCHEDULE THRU DEC 31 EQ-WS2 ..

\$ INFILTRATION SCHEDULE FOR AREAS WITH OUTSIDE DOORS  
INF-DS = D-SCH (1,6)(1)(7,17)(1.5)(18,24)(1) ..  
INF-WEHDS = D-SCH (1,24)(1) ..

INF-WS = W-SCH (WD) INF-DS (WEH) INF-WEHDS ..  
INF-SCH = SCHEDULE THRU DEC 31 INF-WS ..

SPACE CONDITIONS

BILLET=S-C  
T=(74) P-SCH=OC-SCH1  
P-H-L=200 P-H-S=200  
L-SCH=LT-SCH1 E-SCH=EQ-SCH1  
L-T=SUS-FLUOR L-T-S=1.0  
INF-METHOD=AIR-CHANGE AIR-CHANGES/HR=1 ..

OFFICE=S-C  
T=(74) P-SCH=OC-SCH2  
P-H-L=200 P-H-S=200  
L-SCH=LT-SCH2 E-SCH=EQ-SCH2  
L-T=SUS-FLUOR L-T-S=1.0  
INF-METHOD=AIR-CHANGE AIR-CHANGES/HR=1 ..

SET-DEFAULT FOR SPACE F-W=80 ..  
SET-DEFAULT FOR WINDOW G-T=CLEAR ..  
SET-DEFAULT FOR EXTERIOR-WALL CONS=WALLBOT H=18 ..  
SET-DEFAULT FOR UNDERGROUND-FLOOR CONS=FLOOR ..  
SET-DEFAULT FOR DOOR CONS=METALDOOR ..  
SET-DEFAULT FOR INTERIOR-WALL CONS=INTWALL ..  
SET-DEFAULT FOR ROOF CONS=BUREROOF ..

\$ SPACE INPUT

\$ KITCHEN AREA ON FIRST FLOOR

KITCHEN=S X=0 Y=0 Z=0 AZ=0 A=2880 V=25920 S-C=BILLET L-W=2.0  
N-O-P=15 E-KW=2 ..

K-NWALL1=E-W AZ=0 X=32 Y=90 W=32 H=12 ..  
K-NWALL2=E-W AZ=0 X=0 Y=40 W=32 H=12 ..  
K-EWALL=E-W AZ=80 X=66 Y=37 W=50 H=12 ..  
K-SWALL=E-W AZ=180 X=0 Y=0 W=50 H=12 ..  
K-SWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=6 ..  
K-WWALL1=E-W AZ=270 X=0 Y=40 W=40 H=12 ..  
K-WWIND1=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
K-WWALL2=E-W AZ=270 X=32 Y=40 W=50 H=12 ..

\$ FIRST FLOOR

FIRSTFL=S X=50 Y=0 Z=0 AZ=0 A=2600 V=23400 S-C=OFFICE L-W=2.0  
N-O-P=12 E-KW=4 I-SCH=INF-SCH ..  
FF-NWALL=E-W AZ=0 X=16 Y=40 W=48 H=12 ..  
FF-NWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
FF-EWALL=E-W AZ=80 X=65 Y=0 W=40 H=12 ..  
FF-SWALL=E-W AZ=180 X=0 Y=0 W=65 H=12 ..  
FF-SWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=6 ..

\$ SECOND FLOOR

SECONDFL=S X=0 Y=0 Z=15 AZ=0 A=6304 V=56736 S-C=BILLET L-W=2.5  
N-O-P=30 E-KW=7 ..  
SF-NWALL1=E-W AZ=0 X=0 Y=40 W=32 H=12 ..  
SF-NWWIND1=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
SF-NWALL2=E-W AZ=0 X=64 Y=88 W=16 H=12 ..  
SF-NWWIND2=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
SF-NWALL3=E-W AZ=0 X=80 Y=48 W=32 H=12 ..  
SF-NWWIND3=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
SF-EWALL1=E-W AZ=80 X=80 Y=70 W=18 H=12 ..  
SF-EWALL2=E-W AZ=80 X=112 Y=0 W=48 H=12 ..  
SF-SWALL=E-W AZ=180 X=0 Y=0 W=112 H=12 ..  
SF-SWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=13 ..  
SF-WWALL1=E-W AZ=270 X=0 Y=40 W=40 H=12 ..  
SF-WWIND1=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
SF-WWALL2=E-W AZ=270 X=32 Y=30 W=30 H=12 ..  
SF-WWIND2=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=3 ..

\$ SECOND FLOOR BATHROOM  
SFBATH=S X=32 Y=66 Z=15 AZ=0 A=576 V=6912 S-C=BILLET L-W=2.5  
N-O-P=2 E-KW=0 I-SCH=INF-SCH ..  
SFBATH-NWALL=E-W AZ=0 X=32 Y=18 W=32 H=12 ..  
SFBATH-EWALL=E-W AZ=80 X=32 Y=0 W=18 H=12 ..  
SFBATH-EWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
SFBATH-WWALL=E-W AZ=270 X=0 Y=18 W=18 H=12 ..

\$ THIRD FLOOR  
THIRDFL=S X=0 Y=126 Z=30 AZ=0 A=6304 V=56736 S-C=BILLET L-W=2.5  
N-O-P=30 E-KW=7 ..  
TF-NWALL1=E-W AZ=0 X=0 Y=40 W=32 H=12 ..  
TF-NWWIND1=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
TF-NWALL2=E-W AZ=0 X=64 Y=88 W=16 H=12 ..  
TF-NWWIND2=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
TF-NWALL3=E-W AZ=0 X=80 Y=48 W=32 H=12 ..  
TF-NWWIND3=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
TF-EWALL1=E-W AZ=80 X=80 Y=70 W=18 H=12 ..  
TF-EWALL2=E-W AZ=80 X=112 Y=0 W=48 H=12 ..  
TF-SWALL=E-W AZ=180 X=0 Y=0 W=112 H=12 ..  
TF-SWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=13 ..  
TF-WWALL1=E-W AZ=270 X=0 Y=40 W=40 H=12 ..  
TF-WWWIND1=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=4 ..  
TF-WWALL2=E-W AZ=270 X=32 Y=30 W=30 H=12 ..  
TF-WWWIND2=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=3 ..  
TF-ROOF=ROOF CONS=BUREROOF W=79.4 H=79.4 TILT=0 ..

\$ THIRD FLOOR BATHROOM  
TFBATH=S X=0 Y=56 Z=30 AZ=0 A=576 V=6912 S-C=BILLET L-W=2.5  
N-O-P=2 E-KW=0 I-SCH=INF-SCH ..  
TFBATH-NWALL=E-W AZ=0 X=32 Y=18 W=32 H=12 ..  
TFBATH-EWALL=E-W AZ=80 X=32 Y=0 W=18 H=12 ..  
TFBATH-EWWIND=WI G-T=CLEAR X=0 Y=0 H=5 W=3 M=2 ..  
TFBATH-WWALL=E-W AZ=270 X=0 Y=18 W=18 H=12 ..  
TFBATH-ROOF=ROOF CONS=BUREROOF W=24 H=24 TILT=0 ..

END ..  
COMPUTE LOADS ..

\$ SYSTEMS INPUT  
INPUT SYSTEMS ..

SYSTEMS-REPORT V=(SV-A,SV-B) S=(SS-A,SS-B,SS-D,SS-F,SS-G,  
SS-I,SS-J,SS-K,SS-L,SS-M) ..

\$ HEATING AND COOLING DAY SCHEDULES  
HTDS = D-SCH (1,24) (80) ..  
CLDS = D-SCH (1,24) (70) ..

\$ HEATING AND COOLING WEEK SCHEDULES  
HTWS = W-SCH (ALL) HTDS ..  
CLWS = W-SCH (ALL) CLDS ..  
HTSCH = SCHEDULE THRU DEC 31 HTWS ..  
CLSCH = SCHEDULE THRU DEC 31 CLWS ..

\$ HEATING AND COOLING AVAILABILITY SCHEDULES  
HTAVDS = D-SCH (1,24) (1) ..  
HTAVDS2 = D-SCH (1,24) (0) ..  
CLAVDS = D-SCH (1,24) (1) ..  
CLAVDS2 = D-SCH (1,24) (0) ..

HTAVWS = W-SCH (ALL) HTAVDS ..  
HTAVWS2 = W-SCH (ALL) HTAVDS2 ..  
CLAVWS = W-SCH (ALL) CLAVDS ..  
CLAVWS2 = W-SCH (ALL) CLAVDS2 ..  
HTAVSCH = SCHEDULE THRU APR 15 HTAVWS



PLANT-REPORT V=(PV-A) S=(PS-A,PS-B,PS-C,PS-D,BEPS) ..

AND ..  
COMPUTE PLANT ..  
STOP ..

**SAMPLE DOE 2  
OUTPUT FILE  
(BUILDING 1242 BASELINE)**

## BUILDING ENERGY ANALYSIS PROGRAM

DEVELOPED BY  
LAWRENCE BERKELEY LABORATORY/UNIVERSITY OF CALIFORNIA

WITH MAJOR SUPPORT FROM  
UNITED STATES DEPARTMENT OF ENERGY  
ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY  
OFFICE OF BUILDINGS ENERGY RESEARCH AND DEVELOPMENT  
BUILDING SYSTEMS DIVISION

1 BI RELEASE AUG 1986

M	M	IIIIII	CCCCC	RRRRR	000	DDDDD	000	EEEEEE	222	222	1	CCCCC		
MM	MM	I	C	R	R	O	O	D	D	O	O	E		
M	M	I	C	RRRRR	0	0	==	D	D	O	O	EEEEEE		
M	M	I	C	R	R	O	O	D	D	O	O	E		
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1242.SIM

3/16/95

BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- LV-A GENERAL PROJECT AND BUILDING INPUT

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

PERIOD OF STUDY

STARTING DATE ENDING DATE NUMBER OF DAYS

1 JAN 1994 31 DEC 1994 365

SITE CHARACTERISTIC DATA

STATION NAME	LATITUDE (DEG)	LONGITUDE (DEG)	ALTITUDE (FT)	TIME ZONE	BUILDING AZIMUTH (DEG)
TMY RALEIGH, NC	35.5	83.6	0.	5 EST	90.0

RAGG ENERGY STUDY  
BUILDING 1242

HISTORIC RED BRICK BLDG AREA  
BASE CASE

REPORT- LV-B SUMMARY OF SPACES OCCURRING IN THE PROJECT

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

NUMBER OF SPACES 6 EXTERIOR 6 INTERIOR 0

SPACE	SPACE MULT.	TYPE	LIGHTING (WATTS/ SQFT )		PEOPLE	EQUIP. (WATTS/ SQFT )		INfiltration METHOD	AIR CHANGES PER HOUR	FLOW RATE (CFM/SQFT)	AREA (SQFT )	VOLUME (CUFT )
			AZIMUTH	SQFT								
KITCHEN	1.00	EXT	0.0	2.00	15.0	0.00	AIR-CHANGE	1.00	0.00	2880.	25920.	
FIRSTFL	1.00	EXT	0.0	2.00	12.0	0.00	AIR-CHANGE	1.00	0.00	2600.	23400.	
SECONDFL	1.00	EXT	0.0	2.50	30.0	0.00	AIR-CHANGE	1.00	0.00	6304.	56736.	
SFBATH	1.00	EXT	0.0	2.50	2.0	0.00	AIR-CHANGE	1.00	0.00	576.	6912.	
THIRDFL	1.00	EXT	0.0	2.50	30.0	0.00	AIR-CHANGE	1.00	0.00	6304.	56736.	
TFBATH	1.00	EXT	0.0	2.50	2.0	0.00	AIR-CHANGE	1.00	0.00	576.	6912.	
<hr/>						<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	
BUILDING TOTALS			91.0							19240.00	176616.00	

ET BRAGG ENERGY STUDY  
BLDG 1242  
REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

NUMBER OF EXTERIOR SURFACES 33      RECTANGULAR 33      OTHER 0

SURFACE	SPACE	- - - G L A S S - - -		- - - W A L L - - -		- W A L L + G L A S S -		
		U-VALUE (BTU/HR - SQFT)	AREA (SQFT)	U-VALUE (BTU/HR - SQFT)	AREA (SQFT)	U-VALUE (BTU/HR - SQFT)	AREA (SQFT)	AZIMUTH
K-WWALL1	KITCHEN	0.49	30.00	0.09	450.00	0.12	480.00	NORTH
K-WWALL2	KITCHEN	0.00	0.00	0.09	600.00	0.09	600.00	NORTH
SF-WWALL1	SECONDFL	0.49	60.00	0.09	420.00	0.14	480.00	NORTH
SF-WWALL2	SECONDFL	0.49	45.00	0.09	315.00	0.14	360.00	NORTH
SFBATH-WWALL	SFBATH	0.00	0.00	0.09	216.00	0.09	216.00	NORTH
TF-WWALL1	THIRDFL	0.49	60.00	0.09	420.00	0.14	480.00	NORTH
TF-WWALL2	THIRDFL	0.49	45.00	0.09	315.00	0.14	360.00	NORTH
TFBATH-WWALL	TFBATH	0.00	0.00	0.09	216.00	0.09	216.00	NORTH
K-NWALL1	KITCHEN	0.00	0.00	0.09	384.00	0.09	384.00	EAST
K-NWALL2	KITCHEN	0.00	0.00	0.09	384.00	0.09	384.00	EAST
SFBATH-NWALL	SFBATH	0.00	0.00	0.09	384.00	0.09	384.00	EAST
FF-NWALL	FIRSTFL	0.49	30.00	0.09	546.00	0.11	576.00	EAST
TF-NWALL1	THIRDFL	0.49	60.00	0.09	324.00	0.16	384.00	EAST
TF-NWALL2	THIRDFL	0.49	30.00	0.09	162.00	0.16	192.00	EAST
TF-NWALL3	THIRDFL	0.49	60.00	0.09	324.00	0.16	384.00	EAST
SF-NWALL1	SECONDFL	0.49	60.00	0.09	324.00	0.16	384.00	EAST
SF-NWALL2	SECONDFL	0.49	30.00	0.09	162.00	0.16	192.00	EAST
TFBATH-NWALL	TFBATH	0.00	0.00	0.09	384.00	0.09	384.00	EAST
SF-NWALL3	SECONDFL	0.49	60.00	0.09	324.00	0.16	384.00	EAST
SF-EWALL1	SECONDFL	0.00	0.00	0.09	216.00	0.09	216.00	SOUTH
EWALL1	THIRDFL	0.00	0.00	0.09	216.00	0.09	216.00	SOUTH
TF-EWALL2	THIRDFL	0.00	0.00	0.09	576.00	0.09	576.00	SOUTH

FT BRAGG ENERGY STUDY  
Bldg 1242  
REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC  
(CONTINUED)

SFBATH-EWALL	SFBATH	0.49	30.00	0.09	186.00	0.15	216.00	SOUTH
SF-EWALL2	SECONDFL	0.00	0.00	0.09	576.00	0.09	576.00	SOUTH
FF-EWALL	FIRSTFL	0.00	0.00	0.09	480.00	0.09	480.00	SOUTH
TFBATH-EWALL	TFBATH	0.49	30.00	0.09	186.00	0.15	216.00	SOUTH
K-EWALL	KITCHEN	0.00	0.00	0.09	600.00	0.09	600.00	SOUTH
SF-SWALL	SECONDFL	0.49	195.00	0.09	1149.00	0.15	1344.00	WEST
FF-SWALL	FIRSTFL	0.49	90.00	0.09	690.00	0.14	780.00	WEST
TF-SWALL	THIRDFL	0.49	195.00	0.09	1149.00	0.15	1344.00	WEST
K-SWALL	KITCHEN	0.49	90.00	0.09	510.00	0.15	600.00	WEST
TF-ROOF	THIRDFL	0.00	0.00	0.09	6304.36	0.09	6304.36	ROOF
TFBATH-ROOF	TFBATH	0.00	0.00	0.09	576.00	0.09	576.00	ROOF

RAGG ENERGY STUDY  
BUILDING 1242  
REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC  
(CONTINUED)

	AVERAGE U-VALUE/GLASS (BTU/HR - SQFT)	AVERAGE U-VALUE/WALLS (BTU/HR - SQFT)	AVERAGE U-VALUE WALLS+GLASS (BTU/HR - SQFT)	GLASS AREA (SQFT)	OPAQUE AREA (SQFT)	GLASS+OPAQUE AREA (SQFT)
NORTH	0.49	0.09	0.12	240.00	2952.00	3192.00
EAST	0.49	0.09	0.13	330.00	3702.00	4032.00
SOUTH	0.49	0.09	0.10	60.00	3036.00	3096.00
WEST	0.49	0.09	0.15	570.00	3498.00	4068.00
ROOF	0.00	0.09	0.09	0.00	6880.36	6880.36
ALL WALLS	0.49	0.09	0.13	1200.00	13188.00	14388.00
WALLS+ROOFS	0.49	0.09	0.12	1200.00	20068.36	21268.36
BUILDING	0.49	0.09	0.12	1200.00	20068.36	21268.36

RAGG ENERGY STUDY  
BUILDING 1242  
REPORT- LV-I DETAILS OF CONSTRUCTIONS OCCURRING IN THE PROJECT

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

NUMBER OF CONSTRUCTIONS 5      DELAYED 2      QUICK 3

CONSTRUCTION NAME	U-VALUE (BTU/HR - SQFT)	SURFACE		NUMBER OF RESPONSE FACTORS	
		SURFACE ABSORPTANCE	ROUGHNESS INDEX	SURFACE TYPE	
WALLBOT	0.24	0.88	2	DELAYED	17
BUREROOF	0.10	0.75	3	DELAYED	8
FLOOR	0.20	0.70	3	QUICK	0
METALDOOR	0.59	0.70	3	QUICK	0
INTWALL	0.40	0.70	3	QUICK	0

BRAGG ENERGY STUDY  
BLDG 1242

REPORT- LS-A SPACE PEAK LOADS SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

SPACE NAME	MULTIPLIER	CLOUDING LOAD (BTU/HR)	TIME OF PEAK	DRY- BULB	WET- BULB	HEATING LOAD (BTU/HR)	TIME OF PEAK	DRY- BULB	WET- BULB
SPACE	FLOOR								
KITCHEN	1.	1.	40.982	MAY 31 6 PM	86.F	68.F	-53.148	JAN 21 12 MDNT	36.F 33.F
FIRSTFL	1.	1.	53.154	AUG 31 5 PM	88.F	71.F	-51.691	JAN 16 10 AM	14.F 13.F
SECONDFL	1.	1.	107.681	MAY 31 6 PM	86.F	68.F	-109.891	JAN 21 12 MDNT	36.F 33.F
SFBATH	1.	1.	9.435	AUG 31 3 PM	87.F	70.F	-20.064	FEB 9 10 AM	23.F 20.F
THIRDFL	1.	1.	121.226	JUN 28 8 PM	90.F	77.F	-121.494	JAN 17 1 PM	19.F 16.F
TFBATH	1.	1.	10.884	SEP 6 6 PM	95.F	75.F	-22.477	FEB 9 10 AM	23.F 20.F
SUM			343.362				-378.765		
BUILDING PEAK		315.056	MAY 31 6 PM	86.F	68.F	-362.760	JAN 21 12 MDNT	36.F 33.F	

BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- LS-C BUILDING PEAK LOAD COMPONENTS

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

\*\*\* BUILDING \*\*\*

FLOOR AREA	19240	SQFT	1787	SQMT
VOLUME	176616	CUFT	5002	CUMT

TIME	COOLING LOAD			HEATING LOAD		
	=====			=====		
	MAY 31	6PM		JAN 21	12MDNT	
DRY-BULB TEMP	86F	30C		36F	2C	
WET-BULB TEMP	68F	20C		33F	1C	

	SENSIBLE		LATENT		SENSIBLE	
	(KBTU/H)	( KW )	(KBTU/H)	( KW )	(KBTU/H)	( KW )
	-----	-----	-----	-----	-----	-----
WALLS	14.460	4.235	0.000	0.000	-18.405	-5.391
ROOFS	12.456	3.648	0.000	0.000	-9.303	-2.725
GLASS CONDUCTION	6.362	1.863	0.000	0.000	-20.388	-5.971
GLASS SOLAR	45.792	13.411	0.000	0.000	2.552	0.747
DOOR	0.000	0.000	0.000	0.000	0.000	0.000
INTERNAL SURFACES	0.000	0.000	0.000	0.000	0.000	0.000
UNDERGROUND SURFACES	0.000	0.000	0.000	0.000	0.000	0.000
OCCUPANTS TO SPACE	13.427	3.932	15.800	4.627	14.676	4.298
LIGHT TO SPACE	100.859	29.539	0.000	0.000	57.020	16.700
EQUIPMENT TO SPACE	45.914	13.447	0.000	0.000	11.068	3.241
PROCESS TO SPACE	0.000	0.000	0.000	0.000	0.000	0.000
INFILTRATION	75.785	22.196	59.055	17.296	-399.978	-117.144
TOTAL	315.056	92.272	74.855	21.923	-362.760	-106.243
TOTAL LOAD	389.911 KBTU/H		114.195 KW		-362.760 KBTU/H -106.243 KW	
TOTAL LOAD / AREA	20.27BTU/H.SQFT	63.887	W /SQMT	18.854BTU/H.SQFT	59.438	W /SQMT

\*\*\*\*\*
\*  
\* NOTE 1)THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR \*  
\* ---- LOADS \*  
\* 2)TIMES GIVEN IN STANDARD TIME FOR THE LOCATION \*  
\* IN CONSIDERATION \*  
\*\*\*\*\*

RAGG ENERGY STUDY  
BUILDING 1242  
REPORT- LS-D BUILDING MONTHLY LOADS SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 LDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	COOLING					HEATING					ELEC	
	COOLING ENERGY (MBTU)	TIME OF MAX	DRY-BULB	WET-BULB	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX	DRY-BULB	WET-BULB	MAXIMUM HEATING LOAD (KBTU/HR)	ELECTRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	12.83082	25 20	50.F	38.F	142.039	-54.164	21 24	36.F	33.F	-362.760	21507.	65.333
FEB	14.62866	25 22	49.F	41.F	142.484	-39.741	9 10	23.F	20.F	-352.038	19426.	65.333
MAR	25.94331	1 22	58.F	54.F	153.449	-21.508	25 4	38.F	32.F	-188.687	21529.	65.333
APR	58.94000	27 17	80.F	60.F	251.750	-3.267	20 5	43.F	39.F	-101.945	20821.	65.333
MAY	93.93642	31 17	86.F	68.F	315.056	-1.900	6 15	50.F	49.F	-120.690	21507.	65.333
JUN	111.56142	28 18	90.F	77.F	298.711	-0.011	5 5	60.F	57.F	-1.784	20832.	65.333
AUG	123.11762	28 17	90.F	71.F	292.342	0.000				0.000	21495.	65.333
SEP	121.45340	31 17	87.F	70.F	301.112	0.000	28 5	59.F	58.F	-0.020	21529.	65.333
OCT	98.11981	6 17	95.F	75.F	307.081	-0.048	25 7	58.F	56.F	-4.145	20821.	65.333
NOV	59.82496	3 18	77.F	66.F	217.565	-3.864	18 14	50.F	47.F	-91.125	21495.	65.333
DEC	25.38949	4 22	73.F	62.F	179.187	-27.545	18 3	23.F	20.F	-247.330	20809.	65.333
	14.31244	2 21	51.F	45.F	161.359	-38.264	21 10	25.F	22.F	-222.312	21507.	65.333
TOTAL	760.058				-190.310					253279.		
MAX					315.056					-362.760		65.333

## MESSAGE LIST FROM SYSTEMS PROGRAM

\*\*WARNING\*\*\*\*\*

SYSTEM BATHSYS HAS ZERO OUTSIDE AIR FOR DESIGN CALCULATION

\*\*WARNING\*\*\*\*\*

SYSTEM BATHSYS MAY HAVE INADEQUATE HEATING CAPABILITY  
(CHECK HEATING-CAPACITY,HEAT-SET-T,PRE-HEAT-T AND MAX-SUPPLY-T FOR CONSISTENCY)

FT BRAGG ENERGY STUDY

BLDG 1242

PORT- SV-A SYSTEM DESIGN PARAMETERS

HISTORIC RED BRICK BLDG AREA  
BASE CASEDOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NCSYSTEM ALTITUDE  
NAME MULTIPLIER

KITCHENSYS 1.000

SUPPLY FAN (CFM)	RETURN		OUTSIDE AIR		COOLING CAPACITY		HEATING CAPACITY		COOLING EIR		HEATING EIR	
	ELEC (KW)	DELTA-T (F)	FAN (CFM)	ELEC (KW)	DELTA-T (F)	RATIO	(KBTU/HR)	SENSIBLE (SHR)	(KBTU/HR)	(BTU/BTU)	(BTU/BTU)	
1370.	1.073	2.4	0.	0.000	0.0	1.000	73.514	0.602	-112.579	0.00	0.00	

ZONE NAME	SUPPLY FLOW		EXHAUST FLOW		MINIMUM FAN FLOW		OUTSIDE AIR CAPACITY		COOLING CAPACITY		EXTRACTION RATE		HEATING CAPACITY		ADDITION RATE	
						RATIO	FLOW (KBTU/HR)	SENSIBLE (SHR)	FLOW (KBTU/HR)	RATE (KBTU/HR)	CAPACITY (KBTU/HR)	RATE (KBTU/HR)	MULTIPLIER			
KITCHEN	1370.	0.	0.000	1.000	1370.	0.00	0.00	38.47	0.00	-71.02	1.0					

FT-SCG ENERGY STUDY  
BUILDING 1242

REPORT- SV-A SYSTEM DESIGN PARAMETERS

HISTORIC RED BRICK BLDG AREA  
BASE CASE

BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NCSYSTEM ALTITUDE  
NAME MULTIPLIER

BUILDING 1.000

SUPPLY FAN (CFM )	RETURN		ELEC (KW)	DELTA-T (F)	ELEC (KW)	DELTA-T (F)	OUTSIDE AIR RATIO	COOLING CAPACITY (KBTU/HR)	SENSIBLE (SHR)	HEATING CAPACITY (KBTU/HR)	COOLING EIR (BTU/BTU)	HEATING EIR (BTU/BTU)
	FAN (CFM )	ELEC (KW)					AIR CAPACITY (KBTU/HR)	-685.171		0.00	0.00	
11568.	9.058	2.4	0.	0.000	0.0	0.240	595.126	0.596				

ZONE NAME	SUPPLY FLOW	EXHAUST FLOW	FAN (KW)	MINIMUM FLOW	OUTSIDE AIR FLOW	COOLING CAPACITY (KBTU/HR)	SENSIBLE (SHR)	RATE (KBTU/HR)	EXTRACTION CAPACITY (KBTU/HR)	HEATING RATE (KBTU/HR)	ADDITION MULTIPLIER
				RATIO	(KBTU/HR)	(KBTU/HR)			(KBTU/HR)		
FIRSTFL	1800.	0.	0.000	1.000	360.	0.00	0.00	50.54	0.00	-93.31	1.0
SECONDFL	4539.	0.	0.000	1.000	908.	0.00	0.00	127.46	0.00	-235.30	1.0
THIRDFL	4539.	0.	0.000	1.000	908.	0.00	0.00	127.46	0.00	-235.30	1.0
SFBATH	310.	300.	0.000	1.000	300.	0.00	0.00	8.70	0.00	-46.07	1.0
TOTAL	380.	300.	0.000	1.000	300.	0.00	0.00	10.67	0.00	-49.70	1.0

RAGG ENERGY STUDY  
 BUILDING 1242  
 REPORT- SV-A SYSTEM DESIGN PARAMETERS

HISTORIC RED BRICK BLDG AREA  
 BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
 PRESENT ENERGY USAGE  
 WEATHER FILE- TMY RALEIGH, NC

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SYSTEM NAME	ALTITUDE MULTIPLIER										
BATHSYS	1.000										
SUPPLY FAN (CFM )	ELEC (KW)	DELTA-T (F)	RETURN FAN (CFM )	ELEC (KW)	DELTA-T (F)	OUTSIDE AIR RATIO	COOLING CAPACITY (BTU/HR)	SENSIBLE (SHR)	HEATING CAPACITY (BTU/BTU)	COOLING EIR (BTU/BTU)	HEATING EIR (BTU/BTU)
960.	0.751	2.4	0.	0.000	0.0	0.000	0.000	0.000	0.000	0.00	0.00

ZONE NAME	SUPPLY FLOW	EXHAUST FLOW	FAN (KW)	MINIMUM FLOW RATIO	OUTSIDE AIR FLOW (BTU/HR)	COOLING CAPACITY (BTU/HR)	SENSIBLE (SHR)	EXTRACTION RATE (BTU/HR)	HEATING CAPACITY (BTU/HR)	ADDITION RATE (BTU/HR)	MULTIPLIER
KITCHEN	960.	0.	0.000	1.000	0.	0.00	0.00	0.00	0.00	-49.77	1.0

BRAGG ENERGY STUDY  
DING 1242

REPORT- SS-D PLANT MONTHLY LOADS SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DEFAULT-PLANT

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

C O O L I N G						H E A T I N G						E L E C		
MONTH	COOLING	TIME	DRY-	WET-	(KBTU/HR)	MAXIMUM	HEATING	TIME	DRY-	WET-	(KBTU/HR)	MAXIMUM	ELEC-	MAXIMUM
	ENERGY	OF MAX	BULB	BULB		LOAD	ENERGY	OF MAX	BULB	BULB		HEATING	TRICAL	ELEC
	(MBTU)	DY HR	TEMP	TEMP		(MBTU/HR)	(MBTU)	DY HR	TEMP	TEMP		(KBTU/HR)	(KWH)	(KW)
JAN	0.00000					0.000	-147.642	16 10	14.F	13.F		-571.249	32250.	83.971
FEB	0.00000					0.000	-115.381	9 10	23.F	20.F		-534.679	29129.	83.971
MAR	0.00000					0.000	-74.137	25 4	38.F	32.F		-314.203	32250.	83.971
APR	7.65921	27 17	82.F	62.F		280.448	-5.872	1 5	32.F	29.F		-167.558	31210.	83.971
MAY	67.04546	31 16	86.F	70.F		497.440	0.000					0.000	32250.	83.971
JUN	128.03651	27 14	88.F	78.F		612.669	0.000					0.000	31210.	83.971
AUG	160.96661	29 17	85.F	74.F		554.171	0.000					0.000	32250.	83.971
AUG	165.80756	11 17	83.F	76.F		584.444	0.000					0.000	32250.	83.971
SEP	92.40501	7 15	92.F	77.F		563.434	0.000					0.000	31210.	83.971
OCT	19.83142	7 17	73.F	71.F		467.077	-19.371	16 2	46.F	44.F		-270.082	32250.	83.971
NOV	0.00000					0.000	-84.618	18 3	23.F	20.F		-438.890	31210.	83.971
DEC	0.00000					0.000	-117.061	11 6	18.F	16.F		-406.015	32250.	83.971
TOTAL	641.751					-564.081							379719.	
MAX						612.669						-571.249		83.971

FAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-M FAN ELE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	FAN ELECTRIC ENERGY DURING HEATING (KWH)	FAN ELECTRIC ENERGY DURING COOLING (KWH)	FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH)	FAN ELECTRIC ENERGY DURING FLOATING (KWH)
JAN	7641.068	0.000	0.000	454.851
FEB	6821.378	0.000	0.000	491.081
MAR	6885.142	0.000	0.000	1210.794
APR	1588.172	742.024	0.000	5504.583
MAY	0.000	3934.708	0.000	4161.304
JUN	0.000	5740.780	0.000	2094.037
JUL	0.000	6646.198	0.000	1449.760
SEP	0.000	6872.043	0.000	1223.902
OCT	2796.213	1289.430	0.000	4010.355
NOV	6607.783	0.000	0.000	1227.000
DEC	7502.512	0.000	0.000	593.413
ANNUAL	39844.121	30001.867	0.000	25480.416

FT. BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-A SYSTEM MONTHLY LOADS SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

## - - - - - C O O L I N G - - - - -

## - - - - - H E A T I N G - - - - -

## - - - E L E C - - -

MONTH	COOLING ENERGY (MBTU)	TIME OF MAX	DRY- BULB	WET- BULB	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX	DRY- BULB	WET- BULB	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-	MAXIMUM
											TRICAL ENERGY (KWH)	ELEC LOAD (KW)
JAN	0.00000				0.000	-45.897	5 9	8.F	6.F	-138.525	3446.	8.829
FEB	0.00000				0.000	-37.608	9 10	23.F	20.F	-120.038	3112.	8.829
MAR	0.00000				0.000	-27.899	9 5	28.F	24.F	-84.129	3423.	8.829
APR	0.58749	17 16	82.F	65.F	27.602	-3.499	1 5	32.F	29.F	-60.993	3327.	8.829
MAY	9.12778	24 18	87.F	70.F	71.554	0.000				0.000	3446.	8.829
JUN	23.24629	28 18	90.F	78.F	117.483	0.000				0.000	3316.	8.829
JUL	33.57294	23 17	91.F	77.F	106.555	0.000				0.000	3457.	8.829
AUG	30.45890	10 21	82.F	76.F	99.977	0.000				0.000	3423.	8.829
SEP	17.39029	6 18	95.F	75.F	106.330	0.000				0.000	3327.	8.829
OCT	2.24276	1 16	82.F	71.F	48.360	-9.221	16 2	46.F	44.F	-86.522	3457.	8.829
NOV	0.00000				0.000	-29.497	18 3	23.F	20.F	-107.401	3338.	8.829
DEC	0.00000				0.000	-38.812	22 5	16.F	15.F	-108.456	3446.	8.829
TOTAL	116.626					-192.432				40515.		
MAX					117.483					-138.525		8.829

STUDY  
BUILDING 1242  
REPORT- SS-B SYSTEM MONTHLY LOADS SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - Z O N E   C O O L I N G - - - Z O N E   H E A T I N G - - - B A S E B O A R D S - - - - P R E - H E A T - - -

MONTH	ZONE COIL COOLING ENERGY (MBTU)	MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR)	ZONE COIL HEATING ENERGY (MBTU)	MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR)	BASEBOARD HEATING ENERGY (MBTU)	MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR)	PRE-HEAT COIL ENERGY (MBTU)	MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR)
JAN	0.00000	0.000	0.00000	0.000	0.00000	0.000	-11.67391	-58.123
FEB	0.00000	0.000	0.00000	0.000	0.00000	0.000	-7.72842	-47.259
MAR	0.00000	0.000	0.00000	0.000	0.00000	0.000	-2.81301	-33.207
APR	0.00000	0.000	0.00000	0.000	0.00000	0.000	-0.15786	-19.759
MAY	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
JUL	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
AUG	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
SEP	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
OCT	0.00000	0.000	0.00000	0.000	0.00000	0.000	-0.35754	-16.664
NOV	0.00000	0.000	0.00000	0.000	0.00000	0.000	-5.01541	-41.167
DEC	0.00000	0.000	0.00000	0.000	0.00000	0.000	-7.29512	-43.914
TOTAL	0.000		0.000		0.000		-35.041	
MAX		0.000		0.000		0.000		-58.123

FT BRAGG ENERGY STUDY  
DOING 1242  
REPORT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	SENSIBLE COOLING ENERGY (MBTU)	LATENT COOLING ENERGY (MBTU)	MAX TOTAL COOLING ENERGY (KBTU/HR)	SENSIBLE HEAT RATIO AT MAX	TIME OF MAX DY HR		SENSIBLE HEATING ENERGY (MBTU)	LATENT HEATING ENERGY (MBTU)	MAX TOTAL HEATING ENERGY (KBTU/HR)
	JAN	0.00000	0.00000	0.000				-45.89718	0.00000
FEB	0.00000	0.00000	0.000				-37.60761	0.00000	-120.03767
MAR	0.00000	0.00000	0.000				-27.89878	0.00000	-84.12926
APR	0.58749	0.00000	27.602	1.000	17	16	-3.49870	0.00000	-60.993
MAY	7.49865	1.62913	71.554	0.612	24	18	0.00000	0.00000	0.000
JUN	13.35683	9.88946	117.483	0.474	28	18	0.00000	0.00000	0.000
JUL	17.37413	16.19881	106.555	0.473	23	17	0.00000	0.00000	0.000
AUG	16.92943	13.52946	99.977	0.420	10	21	0.00000	0.00000	0.000
SEP	10.37347	7.01682	106.330	0.530	6	18	0.00000	0.00000	0.000
OCT	1.78436	0.45840	48.360	0.405	1	16	-9.22082	0.00000	-86.522
NOV	0.00000	0.00000	0.000				-29.49663	0.00000	-107.40079
DEC	0.00000	0.00000	0.000				-38.81244	0.00000	-108.45625
TOTAL	67.904	48.722					-192.432	0.000	
MAX			117.483	0.474					-138.525

FT DRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-J SYSTEM PEAK HEATING AND COOLING DAYS FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - C O O L I N G - - - - - - - H E A T I N G - - -

JUN 28

JAN 5

HOUR	HOURLY COOLING LOAD (KBTU)				HOURLY HEATING LOAD (KBTU)			
	SENSIBLE HEAT RATIO	DRY- BULB TEMP	WET- BULB TEMP	DRY- BULB TEMP	WET- BULB TEMP	DRY- BULB TEMP	WET- BULB TEMP	
1	54.816	0.402	76.F	73.F	-115.078	12.F	11.F	
2	47.449	0.415	75.F	72.F	-116.910	13.F	11.F	
3	45.300	0.385	74.F	72.F	-117.034	12.F	10.F	
4	37.975	0.399	73.F	71.F	-130.903	11.F	9.F	
5	60.498	0.392	73.F	71.F	-133.020	9.F	7.F	
6	58.845	0.414	74.F	71.F	-118.029	8.F	6.F	
7	38.647	0.437	74.F	71.F	-120.947	7.F	5.F	
8	48.688	0.433	77.F	73.F	-127.280	7.F	5.F	
9	53.845	0.494	81.F	74.F	-138.525	8.F	6.F	
10	60.687	0.515	84.F	75.F	-120.875	11.F	8.F	
	63.541	0.550	86.F	75.F	-117.367	13.F	10.F	
12	65.900	0.584	88.F	75.F	-117.180	16.F	12.F	
13	70.420	0.605	90.F	75.F	-110.289	15.F	12.F	
14	77.420	0.560	90.F	76.F	-107.214	18.F	14.F	
15	84.222	0.524	90.F	77.F	-110.484	20.F	16.F	
16	91.720	0.490	90.F	78.F	-106.651	23.F	17.F	
17	117.483	0.474	90.F	78.F	-102.321	23.F	17.F	
18	112.332	0.494	90.F	77.F	-97.009	20.F	15.F	
19	112.822	0.494	90.F	77.F	-98.199	19.F	15.F	
20	106.213	0.483	87.F	76.F	-105.296	15.F	12.F	
21	100.130	0.456	83.F	75.F	-101.991	15.F	12.F	
22	71.002	0.443	80.F	74.F	-103.491	14.F	11.F	
23	62.576	0.440	78.F	73.F	-116.582	13.F	10.F	
24	54.351	0.457	77.F	72.F	-115.155	11.F	9.F	
<hr/>								
MAX	117.483				-138.525			

ENRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-K SPACE TEMPERATURE SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE

KITCHENSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	AVERAGE SPACE TEMP					AVERAGE TEMPERATURE DIFFERENCE			SUMMED TEMP DIFFERENCE			HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR (PERCENT-RH )
	ALL HOURS	COOLING HOURS	HEATING HOURS	FAN ON HOURS	FAN OFF HOURS	BETWEEN OUTDOOR& ROOM AIR						
	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)
JAN	74.19		74.19	74.19	0.00	-37.00	-37.00	0.00	1146.97	1146.97		-0.00025
FEB	74.22		74.22	74.22	0.00	-34.78	-34.78	0.00	973.96	973.96		-0.00026
MAR	74.44		74.37	74.44	0.00	-26.34	-26.34	0.00	808.32	816.54		-0.00025
APR	71.83	75.64	74.71	71.83	0.00	-12.10	-12.10	0.00	166.00	371.51		-0.00026
MAY	73.29	75.91		73.29	0.00	-5.31	-5.31	0.00		229.60		0.00002
JUN	75.82	76.10		75.82	0.00	-1.94	-1.94	0.00		189.87		0.00163
	76.22	76.23		76.22	0.00	0.27	0.27	0.00		167.54		0.00271
AUG	76.19	76.21		76.19	0.00	0.12	0.12	0.00		163.60		0.00228
SEP	75.47	76.00		75.47	0.00	-3.45	-3.45	0.00		209.43		0.00109
OCT	73.56	75.70	74.48	73.56	0.00	-14.93	-14.93	0.00	305.81	472.75		-0.00019
NOV	74.54		74.35	74.54	0.00	-28.10	-28.10	0.00	828.84	842.96		-0.00026
DEC	74.25		74.25	74.25	0.00	-32.99	-32.99	0.00	1022.78	1022.78		-0.00026
ANNUAL	74.51	76.09	74.32	74.51	0.00	-16.28	-16.28	0.00	5252.69	6607.51		0.00051

ST BRAGG ENERGY STUDY

BLDG 1242

REPORT- SS-L FAN ELECTRIC ENERGY

HISTORIC RED BRICK BLDG AREA

BASE CASE

KITCHENSYS

DOE-2.1C 2/21/1995

11: 6:41 SDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE- TMY RALEIGH, NC

MONTH	FAN ELECTRIC ENERGY DURING HEATING (KWH)	FAN ELECTRIC ENERGY DURING COOLING (KWH)	FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH)	FAN ELECTRIC ENERGY DURING FLOATING (KWH)
JAN	798.094	0.000	0.000	0.000
FEB	720.861	0.000	0.000	0.000
MAR	768.059	0.000	0.000	30.036
APR	240.287	53.635	0.000	478.431
MAY	0.000	465.558	0.000	332.541
JUN	0.000	686.534	0.000	85.817
JUL	0.000	794.876	0.000	3.218
AUG	0.000	785.222	0.000	12.873
SEP	0.000	592.137	0.000	180.215
OCT	338.977	166.270	0.000	292.850
NOV	724.079	0.000	0.000	48.272
DEC	798.094	0.000	0.000	0.000
ANNUAL	4388.589	3544.332	0.000	1464.262

FORBAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS FOR KITCHEN

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	COOLING					HEATING					ELEC		
	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELECTRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)	
JAN	0.00000				0.000	0.000				0.000	2648.	7.757	
FEB	0.00000				0.000	0.000				0.000	2391.	7.757	
MAR	0.00000				0.000	0.000				0.000	2625.	7.757	
APR	0.00000				0.000	0.000				0.000	2554.	7.757	
MAY	0.00000				0.000	0.000				0.000	2648.	7.757	
JUN	0.00000				0.000	0.000				0.000	2543.	7.757	
AUG	0.00000				0.000	0.000				0.000	2659.	7.757	
SEP	0.00000				0.000	0.000				0.000	2554.	7.757	
OCT	0.00000				0.000	0.000				0.000	2659.	7.757	
NOV	0.00000				0.000	0.000				0.000	2566.	7.757	
DEC	0.00000				0.000	0.000				0.000	2648.	7.757	
TOTAL	0.000				0.000					31120.			
MAX					0.000					0.000		7.757	

FT BRAGG ENERGY STUDY  
ING 1242  
REPORT- SS-F ZONE DEMAND SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
KITCHENSYS FOR KITCHEN

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - D E M A N D S - - - - - B A S E B O A R D S - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (BTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	0.81322	-7.901	0.00000	0.000	75.0	73.4	0	0
FEB	1.10559	-5.921	0.00000	0.000	74.8	73.4	0	0
MAR	1.97935	-3.298	0.00000	0.000	78.1	73.8	0	0
APR	7.60275	-0.267	0.00000	0.000	81.3	57.9	5	0
MAY	10.70360	-0.116	0.00000	0.000	76.9	55.5	6	0
JUN	12.57390	0.000	0.00000	0.000	77.2	70.9	0	0
	14.04586	0.000	0.00000	0.000	77.0	74.6	0	0
AUG	13.83191	0.000	0.00000	0.000	76.9	74.2	0	0
SEP	11.27449	-0.008	0.00000	0.000	77.0	69.3	0	0
OCT	7.28792	-0.970	0.00000	0.000	80.0	59.4	6	0
NOV	2.10351	-3.815	0.00000	0.000	79.4	73.7	0	0
DEC	0.95992	-5.595	0.00000	0.000	75.0	73.7	0	0

BRAGG ENERGY STUDY  
DING 1242  
REPORT- SS-A SYSTEM MONTHLY LOADS SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	COOLING						HEATING						ELEC	
	COOLING ENERGY (MBTU)	TIME OF MAX	DRY- BULB	WET- BULB	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX	DRY- BULB	WET- BULB	MAXIMUM HEATING LOAD (KBTU/HR)	ELECTRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)		
JAN	0.00000				0.000	-101.666	16 10	14.F	13.F	-441.832	25598.	66.634		
FEB	0.00000				0.000	-77.727	9 10	23.F	20.F	-414.119	23122.	66.634		
MAR	0.00000				0.000	-46.192	25 4	38.F	32.F	-237.854	25644.	66.634		
APR	7.07172	27 17	82.F	62.F	265.983	-2.355	1 6	32.F	29.F	-109.237	24788.	66.634		
MAY	57.91773	31 16	86.F	70.F	448.060	0.000				0.000	25598.	66.634		
JUN	104.79026	27 14	88.F	78.F	524.310	0.000				0.000	24810.	66.634		
AUG	127.39361	29 17	85.F	74.F	486.248	0.000				0.000	25576.	66.634		
SEP	135.34880	2 12	75.F	73.F	520.993	0.000				0.000	25644.	66.634		
OCT	75.01471	7 15	92.F	77.F	481.526	0.000				0.000	24788.	66.634		
NOV	0.00000				0.000	-10.107	16 2	46.F	44.F	-183.085	25576.	66.634		
DEC	0.00000				0.000	-55.047	18 3	23.F	20.F	-331.120	24765.	66.634		
TOTAL	525.125				-371.301					301503.				
MAX					524.310					-441.832		66.634		

ET BRAGG ENERGY STUDY  
BLDG 1242  
REPORT- SS-B SYSTEM MONTHLY LOADS SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - Z O N E   C O O L I N G - - - Z O N E   H E A T I N G - - - B A S E B O A R D S - - - - P R E - H E A T - - -

MONTH	ZONE COIL COOLING ENERGY (MBTU)	MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR)	ZONE COIL HEATING ENERGY (MBTU)	MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR)	BASEBOARD HEATING ENERGY (MBTU)	MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR)	PRE-HEAT COIL ENERGY (MBTU)	MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR)
JAN	0.00000	0.000	0.00000	0.000	-4.74970	-25.693	0.00000	0.000
FEB	0.00000	0.000	0.00000	0.000	-3.99337	-25.736	0.00000	0.000
MAR	0.00000	0.000	0.00000	0.000	-3.32493	-17.630	0.00000	0.000
APR	0.00000	0.000	0.00000	0.000	-0.50709	-12.084	0.00000	0.000
MAY	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
JUN	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
JUL	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
AUG	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
SEP	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
OCT	0.00000	0.000	0.00000	0.000	-0.73569	-15.609	0.00000	0.000
NOV	0.00000	0.000	0.00000	0.000	-3.07612	-22.039	0.00000	0.000
DEC	0.00000	0.000	0.00000	0.000	-4.15178	-19.796	0.00000	0.000
TOTAL	0.000		0.000		-20.539		0.000	
MAX		0.000		0.000		-25.736		0.000

FT. DODGE ENERGY STUDY  
BUILDING 1242  
REPORT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	SENSIBLE COOLING ENERGY (MBTU)	LATENT COOLING ENERGY (MBTU)	MAX TOTAL COOLING ENERGY (KBTU/HR)	SENSIBLE HEAT RATIO AT MAX	TIME OF MAX DY HR	SENSIBLE HEATING ENERGY (MBTU)	LATENT HEATING ENERGY (MBTU)	MAX TOTAL HEATING ENERGY (KBTU/HR)
JAN	0.00000	0.00000	0.000			-101.66598	0.00000	-441.83203
FEB	0.00000	0.00000	0.000			-77.72722	0.00000	-414.11862
MAR	0.00000	0.00000	0.000			-46.19206	0.00000	-237.85420
APR	7.07172	0.00000	265.983	1.000	27 17	-2.35522	0.00000	-109.237
MAY	51.72304	6.19469	448.060	0.743	31 16	0.00000	0.00000	0.000
JUN	77.69568	27.09459	524.310	0.549	27 14	0.00000	0.00000	0.000
JUL	91.41283	35.98078	486.248	0.634	29 17	0.00000	0.00000	0.000
AUG	96.86974	38.47906	520.993	0.375	2 12	0.00000	0.00000	0.000
SEP	59.20230	15.81241	481.526	0.480	7 15	0.00000	0.00000	0.000
OCT	14.25062	3.33803	449.077	0.390	7 17	-10.10736	0.00000	-183.085
NOV	0.00000	0.00000	0.000			-55.04679	0.00000	-331.12048
DEC	0.00000	0.00000	0.000			-78.20684	0.00000	-306.93356
TOTAL	398.226	126.900				-371.301	0.000	
MAX			524.310	0.379				-441.832

FT BRAGG ENERGY STUDY  
ING 1242  
REPORT- SS-J

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SYSTEM PEAK HEATING AND COOLING DAYS FOR

BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - C O O L I N G - - - - -      - - - H E A T I N G - - -

JUN 27

JAN 16

HOUR	HOURLY COOLING LOAD (KBTU)				HOURLY HEATING LOAD (KBTU)			
	SENSIBLE HEAT RATIO	DRY- BULB TEMP	WET- BULB TEMP		DRY- BULB TEMP	WET- BULB TEMP		
1	152.545	0.783	76.F	74.F	-83.037	35.F	34.F	
2	135.578	0.838	76.F	73.F	-128.854	35.F	34.F	
3	110.399	0.523	75.F	73.F	-115.252	33.F	33.F	
4	103.314	0.538	75.F	73.F	-214.161	32.F	32.F	
5	100.438	0.537	75.F	73.F	-217.728	30.F	30.F	
6	415.984	0.377	75.F	73.F	-302.387	27.F	26.F	
7	444.656	0.379	75.F	73.F	-333.026	25.F	23.F	
8	324.051	0.677	78.F	74.F	-388.674	20.F	19.F	
9	370.613	0.664	81.F	75.F	-430.176	17.F	16.F	
10	404.900	0.662	84.F	76.F	-441.832	14.F	13.F	
11	445.619	0.635	85.F	77.F	-369.727	15.F	13.F	
12	482.643	0.633	87.F	77.F	-393.704	14.F	12.F	
13	524.310	0.610	88.F	78.F	-412.268	14.F	12.F	
14	514.943	0.630	88.F	77.F	-379.282	14.F	12.F	
15	516.835	0.643	89.F	77.F	-438.022	15.F	12.F	
16	524.191	0.642	89.F	77.F	-407.192	15.F	13.F	
17	360.119	0.667	89.F	77.F	-411.060	15.F	12.F	
18	350.960	0.685	88.F	77.F	-359.776	13.F	11.F	
19	314.592	0.730	88.F	76.F	-361.697	13.F	11.F	
20	304.003	0.715	86.F	76.F	-365.302	13.F	11.F	
21	285.920	0.696	83.F	76.F	-338.325	12.F	10.F	
22	250.370	0.707	81.F	75.F	-322.276	12.F	10.F	
23	215.207	0.722	79.F	74.F	-341.554	12.F	10.F	
24	197.942	0.732	78.F	74.F	-372.472	13.F	12.F	
<hr/>								
MAX	524.310				-441.832			

FT BRAGG ENERGY STUDY  
BUILDING 1242  
SRT- SS-K SPACE TEMPERATURE SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	AVERAGE SPACE TEMP					AVERAGE TEMPERATURE DIFFERENCE			SUMMED TEMP DIFFERENCE			HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR (PERCENT-RH )
	ALL HOURS	COOLING HOURS	HEATING HOURS	FAN ON HOURS	FAN OFF HOURS	BETWEEN OUTDOOR& ROOM AIR						
	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)
JAN	75.55		75.54	75.55	0.00	-38.36	-38.36	0.00	1181.13	1189.09		-0.00046
FEB	75.85		75.83	75.85	0.00	-36.41	-36.41	0.00	1006.66	1019.50		-0.00047
MAR	76.08		75.78	76.08	0.00	-27.98	-27.98	0.00	808.51	867.25		-0.00043
APR	76.40	76.41	75.76	76.40	0.00	-16.67	-16.67	0.00	114.87	503.52		-0.00035
MAY	76.79	77.22		76.79	0.00	-8.82	-8.82	0.00		323.30		-0.00004
JUN	77.75	77.67		77.75	0.00	-3.86	-3.86	0.00		222.13		0.00109
AUG	78.23	78.09		78.23	0.00	-1.73	-1.73	0.00		194.34		0.00135
SEP	77.86	77.78		77.86	0.00	-1.56	-1.56	0.00		190.74		0.00142
OCT	76.80	76.79	76.18	76.80	0.00	-18.17	-18.17	0.00	278.77	571.62		-0.00028
NOV	76.19		75.88	76.19	0.00	-29.74	-29.74	0.00	838.17	892.27		-0.00045
DEC	75.55		75.52	75.55	0.00	-34.29	-34.29	0.00	1047.74	1063.06		-0.00046
ANNUAL	76.72	77.60	75.74	76.72	0.00	-18.50	-18.50	0.00	5275.84	7290.44		0.00012

FT. MCGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-L FAN ELECTRIC ENERGY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	FAN ELECTRIC ENERGY DURING HEATING (KWH)	FAN ELECTRIC ENERGY DURING COOLING (KWH)	FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH)	FAN ELECTRIC ENERGY DURING FLOATING (KWH)
JAN	6657.432	0.000	0.000	81.520
FEB	5969.053	0.000	0.000	117.751
MAR	5978.110	0.000	0.000	760.850
APR	1304.315	688.388	0.000	4528.892
MAY	0.000	3469.133	0.000	3269.860
JUN	0.000	5054.233	0.000	1467.354
JUL	0.000	5851.304	0.000	887.659
SEP	0.000	6086.802	0.000	652.157
OCT	2364.074	1123.160	0.000	3251.745
NOV	5715.439	0.000	0.000	806.139
DEC	6584.971	0.000	0.000	153.982
ANNUAL	34574.969	26458.469	0.000	18314.793

FT BRAGG ENERGY STUDY

DING 1242

RT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA

BASE CASE

BUILDING

FOR FIRSTFL

DOE-2.1C 2/21/1995

11: 6:41 SDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE- TMY RALEIGH, NC

## COOLING

## HEATING

## ELEC

MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-	MAXIMUM
											TRICAL ENERGY (KWH)	ELEC LOAD (KW)
JAN	0.00000				0.000	0.000				0.000	2391.	9.196
FEB	0.00000				0.000	0.000				0.000	2163.	9.196
MAR	0.00000				0.000	0.000				0.000	2582.	9.196
APR	0.00000				0.000	0.000				0.000	2378.	9.196
MAY	0.00000				0.000	0.000				0.000	2391.	9.196
JUN	0.00000				0.000	0.000				0.000	2474.	9.196
JUL	0.00000				0.000	0.000				0.000	2296.	9.196
SEP	0.00000				0.000	0.000				0.000	2378.	9.196
OCT	0.00000				0.000	0.000				0.000	2296.	9.196
NOV	0.00000				0.000	0.000				0.000	2283.	9.196
DEC	0.00000				0.000	0.000				0.000	2391.	9.196
TOTAL	0.000				0.000					28602.		
MAX					0.000					0.000		9.196

FT BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-F ZONE DEMAND SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
IN BUILDING FOR FIRSTFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - D E M A N D S - - - - - B A S E B O A R D S - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	1.68454	-8.151	0.00000	0.000	77.9	73.8	0	0
FEB	1.28329	-5.942	0.00000	0.000	76.5	73.9	0	0
MAR	2.25495	-3.333	0.00000	0.000	79.0	74.3	0	5
APR	5.27913	-0.349	0.00000	0.000	84.9	67.1	1	48
MAY	8.97991	-0.337	0.00000	0.000	76.9	63.7	0	0
JUN	11.37358	-0.005	0.00000	0.000	77.0	74.7	0	0
JUL	11.74561	0.000	0.00000	0.000	77.0	75.4	0	0
AUG	12.69283	0.000	0.00000	0.000	77.0	75.2	0	0
SEP	9.77119	-0.021	0.00000	0.000	77.0	74.4	0	0
OCT	5.65583	-1.105	0.00000	0.000	82.5	69.1	1	24
NOV	2.25614	-4.347	0.00000	0.000	81.5	74.1	0	7
DEC	1.71216	-5.991	0.00000	0.000	77.3	74.2	0	0

FT BRAGG ENERGY STUDY  
BUILDING 1242  
RT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING FOR SECONDFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

COOLING						HEATING						ELEC	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELECTRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)	
JAN	0.00000				0.000	0.000				0.000	7732.	22.750	
FEB	0.00000				0.000	0.000				0.000	6983.	22.750	
MAR	0.00000				0.000	0.000				0.000	7662.	22.750	
APR	0.00000				0.000	0.000				0.000	7459.	22.750	
MAY	0.00000				0.000	0.000				0.000	7732.	22.750	
JUN	0.00000				0.000	0.000				0.000	7424.	22.750	
JUL	0.00000				0.000	0.000				0.000	7767.	22.750	
SEP	0.00000				0.000	0.000				0.000	7662.	22.750	
OCT	0.00000				0.000	0.000				0.000	7767.	22.750	
NOV	0.00000				0.000	0.000				0.000	7494.	22.750	
DEC	0.00000				0.000	0.000				0.000	7732.	22.750	
TOTAL	0.000				0.000					90870.			
MAX					0.000					0.000		22.750	

FT BRAGG ENERGY STUDY

BUILDING 1242

REPORT- SS-F ZONE DEMAND SUMMARY

HISTORIC RED BRICK BLDG AREA

BASE CASE

IN BUILDING

FOR SECONDFL

DOE-2.1C 2/21/1995

11: 6:41 SDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE- TMY RALEIGH, NC

- - - - D E M A N D S - - - - - B A S E B O A R D S - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	5.06803	-11.483	0.00000	0.000	82.4	71.8	0	0
FEB	5.54551	-7.861	0.00000	0.000	82.2	72.5	0	0
MAR	8.97720	-3.289	0.00000	0.000	82.5	72.4	0	0
APR	19.80321	-0.035	0.00000	0.000	85.0	69.5	0	0
MAY	29.83605	0.000	0.00000	0.000	83.5	68.8	3	0
JUN	34.98360	0.000	0.00000	0.000	83.4	72.5	0	0
JUL	37.20374	0.000	0.00000	0.000	83.2	72.5	0	0
AUG	37.99163	0.000	0.00000	0.000	83.2	72.4	0	0
SEP	31.06219	0.000	0.00000	0.000	83.8	72.4	0	0
OCT	20.54870	-0.509	0.00000	0.000	85.0	72.2	0	0
NOV	8.96300	-4.927	0.00000	0.000	82.5	72.4	0	0
DEC	5.32018	-7.071	0.00000	0.000	82.2	72.0	0	0

FT BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING FOR THIRDFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - C O O L I N G - - - -					- - - - H E A T I N G - - - -					- - - E L E C - - -		
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB HR	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB HR	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	0.00000				0.000	0.000				0.000	7732.	22.750
FEB	0.00000				0.000	0.000				0.000	6983.	22.750
MAR	0.00000				0.000	0.000				0.000	7662.	22.750
APR	0.00000				0.000	0.000				0.000	7459.	22.750
MAY	0.00000				0.000	0.000				0.000	7732.	22.750
JUN	0.00000				0.000	0.000				0.000	7424.	22.750
JUL	0.00000				0.000	0.000				0.000	7767.	22.750
AUG	0.00000				0.000	0.000				0.000	7662.	22.750
SEP	0.00000				0.000	0.000				0.000	7459.	22.750
OCT	0.00000				0.000	0.000				0.000	7767.	22.750
NOV	0.00000				0.000	0.000				0.000	7494.	22.750
DEC	0.00000				0.000	0.000				0.000	7732.	22.750
TOTAL	0.000				0.000	0.000				90870.		
MAX					0.000					0.000		22.750

FT BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-F ZONE DEMAND SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
IN BUILDING FOR THIRDFL

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - D E M A N D S - - - - - B A S E B O A R D S - - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	1.67783	-19.985	0.00000	0.000	79.1	67.5	4	0
FEB	2.05464	-14.028	0.00000	0.000	79.5	68.9	3	0
MAR	4.95725	-6.590	0.00000	0.000	80.7	69.8	4	0
APR	16.95705	-0.148	0.00000	0.000	84.5	68.2	0	0
MAY	29.96055	-0.002	0.00000	0.000	83.9	67.1	2	0
JUN	37.29720	0.000	0.00000	0.000	84.0	73.0	0	0
JUL	40.54243	0.000	0.00000	0.000	84.0	73.5	0	0
	40.92525	0.000	0.00000	0.000	83.7	73.3	0	0
SEP	32.00864	0.000	0.00000	0.000	84.3	72.2	0	0
OCT	17.09072	-1.176	0.00000	0.000	84.0	71.0	0	0
NOV	4.63850	-9.174	0.00000	0.000	80.3	69.3	1	0
DEC	1.86481	-14.513	0.00000	0.000	79.6	68.6	4	0

FT BRAGG ENERGY STUDY  
BUILDING 1242  
T- SS-G ZONE LO

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING FOR SFBATH

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - - COOLING - - - - -

## - - - - - HEATING - - - - -

- - - E L E C - - -

MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)		HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)		ELECTRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
					MAX	HR								
JAN	0.00000				0.000		0.000					0.000	502.	1.439
FEB	0.00000				0.000		0.000					0.000	454.	1.439
MAR	0.00000				0.000		0.000					0.000	499.	1.439
APR	0.00000				0.000		0.000					0.000	485.	1.439
MAY	0.00000				0.000		0.000					0.000	502.	1.439
JUN	0.00000				0.000		0.000					0.000	483.	1.439
JUL	0.00000				0.000		0.000					0.000	504.	1.439
SEP	0.00000				0.000		0.000					0.000	499.	1.439
OCT	0.00000				0.000		0.000					0.000	485.	1.439
NOV	0.00000				0.000		0.000					0.000	487.	1.439
DEC	0.00000				0.000		0.000					0.000	502.	1.439
TOTAL	0.000				0.000		0.000					5906.		
MAX					0.000							0.000		1.439

FT BRAGG ENERGY STUDY

BUILDING 1242

REPORT- SS-F ZONE DEMAND SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING  
FOR SFBATH

124.

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

## - - - D E M A N D S - - - - B A S E B O A R D S - - - - T E M P E R A T U R E S - - - L O A D S N O T M E T -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	0.19785	-1.487	-1.82110	-11.978	77.3	74.3	0	0
FEB	0.17338	-1.054	-1.58559	-12.475	77.8	74.2	0	0
MAR	0.30398	-0.590	-1.30451	-8.357	79.8	74.5	0	0
APR	0.83505	-0.049	-0.17853	-4.937	82.9	64.5	3	0
MAY	1.74050	-0.028	0.00000	0.000	81.5	64.9	1	0
JUN	2.34640	0.000	0.00000	0.000	82.5	72.3	0	0
JUL	2.62096	0.000	0.00000	0.000	82.4	74.1	0	0
	2.80033	0.000	0.00000	0.000	82.8	74.0	0	0
SEP	2.16232	0.000	0.00000	0.000	84.5	71.8	0	0
OCT	1.18058	-0.130	-0.23494	-7.205	84.6	69.5	0	0
NOV	0.36504	-0.737	-1.16720	-10.404	80.0	74.4	0	0
DEC	0.20744	-1.064	-1.56946	-9.267	77.8	74.4	0	0

FT BRAGG ENERGY STUDY

BUILDING 1242

REPORT- SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BUILDING FOR TFBATH

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

## - - - - C O O L I N G - - - -

## - - - - H E A T I N G - - - -

## - - - E L E C - - -

MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DRY- BULB TEMP			WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DRY- BULB TEMP			WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
		DY	HR					DY	HR					
JAN	0.00000				0.000	0.000						0.000	502.	1.439
FEB	0.00000				0.000	0.000						0.000	454.	1.439
MAR	0.00000				0.000	0.000						0.000	499.	1.439
APR	0.00000				0.000	0.000						0.000	485.	1.439
MAY	0.00000				0.000	0.000						0.000	502.	1.439
JUN	0.00000				0.000	0.000						0.000	483.	1.439
JUL	0.00000				0.000	0.000						0.000	504.	1.439
SEP	0.00000				0.000	0.000						0.000	499.	1.439
OCT	0.00000				0.000	0.000						0.000	485.	1.439
NOV	0.00000				0.000	0.000						0.000	504.	1.439
DEC	0.00000				0.000	0.000						0.000	487.	1.439
TOTAL	0.000					0.000						0.000	5906.	
'AX					0.000							0.000		1.439

FT BRAGG ENERGY STUDY  
BUILDING 1242  
REPORT- SS-F ZONE DEMAND SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
IN BUILDING FOR TFBATH

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - D E M A N D S - - - - - B A S E B O A R D S - - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	0.19682	-1.933	-2.92860	-13.715	75.9	74.1	0	0
FEB	0.15708	-1.436	-2.40778	-13.261	76.3	74.2	0	0
MAR	0.29791	-0.791	-2.02042	-9.424	78.9	74.4	0	0
APR	0.85421	-0.099	-0.32855	-7.147	82.5	63.5	2	0
MAY	1.97746	-0.062	0.00000	0.000	81.5	63.3	0	0
JUN	2.73139	0.000	0.00000	0.000	82.2	71.5	0	0
JUL	3.09002	0.000	0.00000	0.000	82.5	73.2	0	0
	3.23991	0.000	0.00000	0.000	82.4	73.1	0	0
SEP	2.40195	0.000	0.00000	0.000	83.7	70.7	0	0
OCT	1.16481	-0.211	-0.50074	-8.404	83.4	67.6	0	0
NOV	0.34257	-1.033	-1.90892	-11.635	78.5	74.3	0	0
DEC	0.20049	-1.437	-2.58232	-10.541	76.5	74.4	0	0

FT BRAGG ENERGY STUDY  
BUILDING 1242  
PORT- SS-A

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SYSTEM MONTHLY LOADS SUMMARY FOR

BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

COOLING						HEATING						ELEC		
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB HR	WET- BULB	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	DRY- BULB HR	WET- BULB	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)		
JAN	0.00000				0.000	-0.079	15	22	36.F 34.F	-1.793	3206.	8.508		
FEB	0.00000				0.000	-0.046	9	8	23.F 20.F	-1.139	2896.	8.508		
MAR	0.00000				0.000	-0.046	2	23	44.F 41.F	-0.932	3184.	8.508		
APR	0.00000				0.000	-0.018	14	23	56.F 55.F	-0.836	3095.	8.508		
MAY	0.00000				0.000	0.000				0.000	3206.	8.508		
JUN	0.00000				0.000	0.000				0.000	3084.	8.508		
JUL	0.00000				0.000	0.000				0.000	3218.	8.508		
SEP	0.00000				0.000	0.000				0.000	3095.	8.508		
OCT	0.00000				0.000	-0.043	24	8	66.F 60.F	-1.417	3218.	8.508		
NOV	0.00000				0.000	-0.074	24	24	40.F 36.F	-1.265	3107.	8.508		
DEC	0.00000				0.000	-0.042	2	23	46.F 42.F	-0.948	3206.	8.508		
TOTAL	0.000				-0.348						37697.			
MAX					0.000					-1.793		8.508		

FT BRAGG ENERGY STUDY  
BLDG 1242  
PORT- SS-B

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SYSTEM MONTHLY LOADS SUMMARY FOR

BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

-- ZONE COOLING -- -- ZONE HEATING -- -- BASEBOARDS -- -- - P R E - H E A T -- -

MONTH	ZONE COIL COOLING ENERGY (MBTU)	MAXIMUM ZONE COIL COOLING LOAD (KBTU/HR)	ZONE COIL HEATING ENERGY (MBTU)	MAXIMUM ZONE COIL HEATING LOAD (KBTU/HR)	BASEBOARD HEATING ENERGY (MBTU)	MAXIMUM BASEBOARD HEATING LOAD (KBTU/HR)	PRE-HEAT COIL ENERGY (MBTU)	MAXIMUM PRE-HEAT COIL LOAD (KBTU/HR)
JAN	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
FEB	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
MAR	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
APR	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
MAY	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
JUN	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
AUG	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
SEP	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
OCT	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
NOV	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
DEC	0.00000	0.000	0.00000	0.000	0.00000	0.000	0.00000	0.000
TOTAL	0.000		0.000		0.000		0.000	
MAX		0.000		0.000		0.000		0.000

FT BRAGG ENERGY STUDY  
BUILDING 1242  
WRT- SS-I SYSTEM MONTHLY SOURCE-LATENT SUMMARY FOR

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	SENSIBLE COOLING ENERGY (MBTU)	LATENT COOLING ENERGY (MBTU)	MAX TOTAL COOLING ENERGY (KBTU/HR)	SENSIBLE HEAT RATIO AT MAX	TIME OF MAX DY HR	SENSIBLE HEATING ENERGY (MBTU)	LATENT HEATING ENERGY (MBTU)	MAX TOTAL HEATING ENERGY (KBTU/HR)
JAN	0.00000	0.00000	0.000			-0.07865	0.00000	-1.79308
FEB	0.00000	0.00000	0.000			-0.04573	0.00000	-1.13853
MAR	0.00000	0.00000	0.000			-0.04582	0.00000	-0.93229
APR	0.00000	0.00000	0.000			-0.01812	0.00000	-0.83565
MAY	0.00000	0.00000	0.000			0.00000	0.00000	0.00000
JUN	0.00000	0.00000	0.000			0.00000	0.00000	0.00000
JUL	0.00000	0.00000	0.000			0.00000	0.00000	0.00000
AUG	0.00000	0.00000	0.000			0.00000	0.00000	0.00000
SEP	0.00000	0.00000	0.000			0.00000	0.00000	0.00000
	0.00000	0.00000	0.000			-0.04308	0.00000	-1.41660
NOV	0.00000	0.00000	0.000			-0.07448	0.00000	-1.26488
DEC	0.00000	0.00000	0.000			-0.04201	0.00000	-0.94784
	-----	-----	-----			-----	-----	-----
TOTAL	0.000	0.000				-0.348	0.000	
MAX			0.000	0.000				-1.793

FT BRAGG ENERGY STUDY  
Bldg 1242  
REPORT- SS-J

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SYSTEM PEAK HEATING AND COOLING DAYS FOR BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALIEGH, NC

- - - - C O O L I N G - - - - H E A T I N G - - -

DEC 31

JAN 15

HOUR	HOURLY COOLING LOAD (KBTU)			HOURLY HEATING LOAD (KBTU)		
	SENSIBLE HEAT RATIO	DRY- BULB TEMP	WET- BULB TEMP	DRY- BULB TEMP	WET- BULB TEMP	
1	0.000	0.000	44.F	43.F	0.000	55.F
2	0.000	0.000	44.F	43.F	0.000	54.F
3	0.000	0.000	45.F	43.F	0.000	54.F
4	0.000	0.000	45.F	44.F	0.000	53.F
5	0.000	0.000	49.F	47.F	-0.116	54.F
6	0.000	0.000	52.F	51.F	0.000	53.F
7	0.000	0.000	56.F	55.F	0.000	52.F
8	0.000	0.000	55.F	54.F	-0.044	51.F
9	0.000	0.000	55.F	53.F	0.000	53.F
10	0.000	0.000	54.F	52.F	0.000	56.F
	0.000	0.000	54.F	48.F	0.000	54.F
	0.000	0.000	53.F	45.F	0.000	53.F
13	0.000	0.000	53.F	43.F	0.000	53.F
14	0.000	0.000	53.F	45.F	0.000	52.F
15	0.000	0.000	53.F	48.F	0.000	52.F
16	0.000	0.000	53.F	52.F	0.000	53.F
17	0.000	0.000	53.F	52.F	0.000	53.F
18	0.000	0.000	53.F	52.F	-0.364	53.F
19	0.000	0.000	53.F	51.F	-0.238	49.F
20	0.000	0.000	52.F	50.F	0.000	40.F
21	0.000	0.000	51.F	49.F	0.000	39.F
22	0.000	0.000	50.F	49.F	-1.793	36.F
23	0.000	0.000	49.F	48.F	0.000	35.F
24	0.000	0.000	48.F	47.F	0.000	36.F
<hr/>						
MAX	0.000					-1.793

FT BRAGG ENERGY STUDY  
BUILDING 1242  
SRT- SS-K SPACE TEMPERATURE SUMMARY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	AVERAGE SPACE TEMP					AVERAGE TEMPERATURE DIFFERENCE			SUMMED TEMP DIFFERENCE			HUMIDITY RATIO DIFFERENCE BETWEEN OUTDOOR AND ROOM AIR (PERCENT-RH )
	ALL HOURS	COOLING HOURS	HEATING HOURS	FAN ON HOURS	FAN OFF HOURS	BETWEEN OUTDOOR& ROOM AIR						
	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	
JAN	64.18		63.10	64.18	0.00	-26.99	-26.99	0.00	316.87	839.30		-0.00162
FEB	67.40		65.82	67.40	0.00	-27.97	-27.97	0.00	225.34	783.07		-0.00170
MAR	75.61		75.21	75.61	0.00	-27.51	-27.51	0.00	233.15	852.84		-0.00159
APR	88.92		88.62	88.92	0.00	-29.19	-29.19	0.00	76.96	875.80		-0.00170
MAY	98.00			98.00	0.00	-30.02	-30.02	0.00				-0.00161
JUN	109.83			109.83	0.00	-35.95	-35.95	0.00				-0.00237
AUG	113.74			113.74	0.00	-37.25	-37.25	0.00				-0.00215
	115.56			115.56	0.00	-39.25	-39.25	0.00				-0.00196
SEP	109.26			109.26	0.00	-37.24	-37.24	0.00				-0.00177
OCT	94.59		88.13	94.59	0.00	-35.96	-35.96	0.00	185.61	1114.77		-0.00235
NOV	76.29		75.24	76.29	0.00	-29.85	-29.85	0.00	310.92	895.42		-0.00163
DEC	67.97		67.39	67.97	0.00	-26.71	-26.71	0.00	202.37	827.91		-0.00158
ANNUAL	90.23	0.00	72.23	90.23	0.00	-32.01	-32.01	0.00	1551.20	11687.07		-0.00184

FT BRAGG ENERGY STUDY  
Bldg 1242  
RT- SS-L FAN ELECTRIC ENERGY

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BATHSYS

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MONTH	FAN ELECTRIC ENERGY DURING HEATING (KWH)	FAN ELECTRIC ENERGY DURING COOLING (KWH)	FAN ELECTRIC ENERGY DURING HEATING-COOLING (KWH)	FAN ELECTRIC ENERGY DURING FLOATING (KWH)
JAN	185.540	0.000	0.000	373.331
FEB	131.456	0.000	0.000	373.331
MAR	138.967	0.000	0.000	419.903
APR	43.568	0.000	0.000	497.273
MAY	0.000	0.000	0.000	558.868
JUN	0.000	0.000	0.000	540.840
JUL	0.000	0.000	0.000	558.868
AUG	0.000	0.000	0.000	558.868
SEP	0.000	0.000	0.000	540.840
OCT	93.146	0.000	0.000	465.724
NOV	168.263	0.000	0.000	372.580
DEC	119.437	0.000	0.000	439.434
ANNUAL	880.364	0.000	0.000	5699.663

FT BRAGG ENERGY STUDY  
BUILDING 1242

REPORT SS-G ZONE LOADS SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BATHSYS FOR KITCHEN

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

## - - - - C O O L I N G - - - -

## - - - - H E A T I N G - - - -

## - - - - E L E C - - -

MONTH	COOLING ENERGY (MBTU)	MAXIMUM COOLING LOAD (KBTU/HR)				HEATING ENERGY (MBTU)	MAXIMUM HEATING LOAD (KBTU/HR)				ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)	
		TIME OF MAX DY	DRY- BULB TEMP HR	WET- BULB TEMP			TIME OF MAX DY	DRY- BULB TEMP	WET- BULB TEMP				
JAN	0.00000				0.000	0.000	21	17	59.F	58.F	0.000	2648.	7.757
FEB	0.00000				0.000	0.000	25	16	62.F	46.F	0.000	2391.	7.757
MAR	0.00000				0.000	0.000	24	16	45.F	35.F	0.000	2625.	7.757
APR	0.00000				0.000	0.000					0.000	2554.	7.757
MAY	0.00000				0.000	0.000					0.000	2648.	7.757
JUN	0.00000				0.000	0.000					0.000	2543.	7.757
JUL	0.00000				0.000	0.000					0.000	2659.	7.757
AUG	0.00000				0.000	0.000					0.000	2625.	7.757
SEP	0.00000				0.000	0.000					0.000	2554.	7.757
OCT	0.00000				0.000	0.000					0.000	2659.	7.757
NOV	0.00000				0.000	0.000	30	2	20.F	19.F	0.000	2566.	7.757
DEC	0.00000				0.000	0.000	7	1	35.F	32.F	0.000	2648.	7.757
TOTAL	0.000				0.000							31120.	
MAX					0.000							0.000	7.757

FT BRAGG ENERGY STUDY  
DING 1242  
ORT- SS-F ZONE DEMAND SUMMARY IN

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
BATHSYS FOR KITCHEN

DOE-2.1C 2/21/1995 11: 6:41 SDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

- - - - D E M A N D S - - - - - B A S E B O A R D S - - - - - T E M P E R A T U R E S - - - - L O A D S N O T M E T - -

MONTH	HEAT EXTRACTION ENERGY (MBTU)	HEAT ADDITION ENERGY (MBTU)	BASEBOARD ENERGY (MBTU)	MAXIMUM BASEBOARD LOAD (KBTU/HR)	MAXIMUM ZONE TEMP (F)	MINIMUM ZONE TEMP (F)	HOURS UNDER HEATED	HOURS UNDER COOLED
JAN	0.00000	-1.851	0.00000	0.000	77.0	50.5	12	0
FEB	0.00000	-1.668	0.00000	0.000	81.2	52.8	2	0
MAR	0.00000	-1.845	0.00000	0.000	85.9	66.7	1	0
APR	0.00000	-1.771	0.00000	0.000	99.2	75.7	0	0
MAY	0.00000	-1.821	0.00000	0.000	113.3	81.7	0	0
JUN	0.00000	-1.760	0.00000	0.000	118.8	101.9	0	0
AUG	0.00000	-1.822	0.00000	0.000	120.4	105.7	0	0
SEP	0.00000	-1.819	0.00000	0.000	123.0	103.8	0	0
OCT	0.00000	-1.771	0.00000	0.000	125.3	98.9	0	0
NOV	0.00000	-1.842	0.00000	0.000	107.0	77.7	0	0
DEC	0.00000	-1.792	0.00000	0.000	88.4	60.9	3	0
	0.00000	-1.845	0.00000	0.000	81.0	55.5	4	0

FT BRAGG ENERGY STUDY  
BLDG 1242  
ORT- PV-A EQUIPMENT SIZES

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

E Q U I P M E N T	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER
	SIZE (MBTU//)	INSTD AVAIL (MBTU//)	SIZE (MBTU//)	INSTD AVAIL (MBTU//)	SIZE (MBTU//)	INSTD AVAIL (MBTU//)	SIZE (MBTU//)
HW-BOILER	2.000	1	1				
HERM-REC-CHLR	1.200	1	1				

FT BRAGG ENERGY STUDY  
BUILDING 1242  
PORT- PS-A PLANT E

HISTORIC RED BRICK BLDG AREA  
BASE CASE  
SUMMARY

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

	S I T E   E N E R G Y												* * * * * *	
	2	3	4	5	6	7	8	9	10	11	12	13	* * * * * *	14
MONTH	TOTAL HEAT LOAD	TOTAL COOLING LOAD	TOTAL ELECTR LOAD	RCVRED ENERGY	WASTED ENERGY	HEAT INPUT COOLING	ELEC INPUT COOLING	FUEL INPUT HEATING	ELEC INPUT HEATING	FUEL INPUT ELECT	TOTAL FUEL INPUT	TOTAL SITE ENERGY	* * * * * *	TOTAL SOURCE ENERGY
JAN	187.0	0.0	130.1 38.1E	0.0	0.0	0.0	0.0	317.0 0.0E	20.0 5.8E	0.0	317.0	447.1	* * *	707.6
FEB	150.9	0.0	116.0 34.0E	0.0	0.0	0.0	0.0	256.4 0.0E	16.6 4.9E	0.0	256.4	372.5	* * *	604.9
MAR	112.2	0.0	123.5 36.2E	0.0	0.0	0.0	0.0	190.8 0.0E	13.4 3.9E	0.0	190.8	314.3	* * *	561.8
APR	18.4	8.8	114.1 33.4E	0.0	0.0	0.0	4.7 1.4E	31.3	2.8 0.8E	0.0	31.3	145.4	* * *	373.8
MAY	0.0	73.0	147.4 43.2E	0.0	0.0	0.0	37.3 10.9E	0.0	0.0 0.0E	0.0	0.0	147.4	* * *	442.7
JUN	0.0	136.2	172.1 50.4E	0.0	0.0	0.0	65.5 19.2E	0.0	0.0 0.0E	0.0	0.0	172.1	* * *	516.9
JUL	0.0	170.1	192.5 56.4E	0.0	0.0	0.0	82.4 24.1E	0.0	0.0 0.0E	0.0	0.0	192.5	* * *	578.0
AUG	0.0	174.8	193.5 56.7E	0.0	0.0	0.0	83.4 24.4E	0.0	0.0 0.0E	0.0	0.0	193.5	* * *	581.2
SEP	0.0	99.9	156.5 45.9E	0.0	0.0	0.0	49.9 14.6E	0.0	0.0 0.0E	0.0	0.0	156.5	* * *	469.9
OCT	36.6	22.0	126.2 37.0E	0.0	0.0	0.0	11.3 3.3E	62.2	4.8 1.4E	0.0	62.2	188.5	* * *	441.4
NOV	120.6	0.0	120.5 35.3E	0.0	0.0	0.0	0.0 0.0E	205.0	14.0 4.1E	0.0	205.0	325.5	* * *	566.9
DEC	156.4	0.0	127.6 37.4E	0.0	0.0	0.0	0.0 0.0E	265.9	17.4 5.1E	0.0	265.9	393.4	* * *	648.9
	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	*	=====
	782.3	684.7	1720.1 504.0E	0.0	0.0	0.0	334.6 98.0E	1328.6	89.0 26.1E	0.0	1328.6	3048.7	* *	6494.1

NOTE-- ALL ENTRIES ARE IN MBTU EXCEPT  
ENTRIES FOLLOWED BY E ARE IN MWH (THOUSANDS OF KWH)

FT BRAGG ENERGY STUDY

BUILDING 1242

REPORT PS-B MONTHLY PEAK AND TOTAL ENERGY USE

HISTORIC RED BRICK BLDG AREA  
BASE CASEDOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

MO	UTILITY-	ELECTRICITY	FUEL-OIL
	TOTAL(MBTU)	130.081	316.989
JAN	PEAK(KBTU)	334.615	1003.462
	DY/HR	5/ 7	16/10
	TOTAL(MBTU)	116.041	256.445
FEB	PEAK(KBTU)	329.611	958.361
	DY/HR	9/ 7	9/10
	TOTAL(MBTU)	123.547	190.763
MAR	PEAK(KBTU)	317.129	623.944
	DY/HR	9/ 7	25/ 4
	TOTAL(MBTU)	114.061	31.299
APR	PEAK(KBTU)	362.696	374.720
	DY/HR	27/18	1/ 5
	TOTAL(MBTU)	147.416	0.000
MAY	PEAK(KBTU)	424.350	0.000
	DY/HR	31/18	31/ 1
	TOTAL(MBTU)	172.112	0.000
JUN	PEAK(KBTU)	477.714	0.000
	DY/HR	27/ 7	30/ 1
	TOTAL(MBTU)	192.484	0.000
JUL	PEAK(KBTU)	461.194	0.000
	DY/HR	22/ 7	31/ 1
	TOTAL(MBTU)	193.532	0.000
AUG	PEAK(KBTU)	474.055	0.000
	DY/HR	1/ 7	31/ 1
	TOTAL(MBTU)	156.490	0.000
SEP	PEAK(KBTU)	475.166	0.000
	DY/HR	6/18	30/ 1
	TOTAL(MBTU)	126.247	62.247
OCT	PEAK(KBTU)	386.771	548.962
	DY/HR	6/18	16/ 2
	TOTAL(MBTU)	120.533	204.978
NOV	PEAK(KBTU)	327.506	835.851
	DY/HR	7/ 7	18/ 3
	TOTAL(MBTU)	127.555	265.873
DEC	PEAK(KBTU)	327.295	779.980
	DY/HR	22/ 7	11/ 6

FT BRAGG ENERGY STUDY

BUILDING 1242

RT- PS-B MONTHLY PEAK AND TOTAL ENERGY USE

HISTORIC RED BRICK BLDG AREA

BASE CASE

DOE-2.1C 2/21/1995

11: 6:41 PDL RUN 1

PRESENT ENERGY USAGE

WEATHER FILE- TMY RALEIGH, NC

(CONTINUED)-----

UTILITY-	ELECTRICITY	FUEL-OIL
ONE YEAR	1720.100	1328.594
USE/PEAK	0.478	1.003

FT BRAGG ENERGY STUDY  
BUILDING 1242  
PORT- PS-C EQUIPMENT PART LOAD OPERATION

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

EQUIPMENT	HOURS AT PERCENT PART LOAD RATIO												TOTAL HOURS	ANNUAL LOAD (MBTU)	FALSE LOAD (MBTU)	ELEC USED (MBTU)	THERMAL USED (MBTU)					
	0	--	10	--	20	--	30	--	40	--	50	--	60	--	70	--	80	--	90	--	100	-
HW-BOILER	2532	1328	260	3	0	0	0	0	0	0	0	0	4123	782.3	0.0	68.7	1328.6					
	2532	1328	260	3	0	0	0	0	0	0	0	0										
HERM-REC-CHLR	1391	817	817	387	84	5	0	0	0	0	0	0	3501	684.7	0.0	310.7	0.0					
	1391	817	817	387	84	5	0	0	0	0	0	0										

HOT LOOP CIRCULATION PUMP ELECTRICAL USE = 20.3 MBTU

COLD LOOP CIRCULATION PUMP ELECTRICAL USE = 23.9 MBTU

#### NOTES TO TABLE

- 1) THE FIRST PART LOAD ENTRY FOR EACH PIECE OF EQUIPMENT IS THE HOURLY LOAD DIVIDED BY THE HOURLY OPERATING CAPACITY
- 2) THE SECOND PART LOAD ENTRY FOR EACH PIECE OF EQUIPMENT IS THE HOURLY LOAD DIVIDED BY THE TOTAL INSTALLED CAPACITY

FT BRAGG ENERGY STUDY  
BUILDING 1242

RECENT- PS-D PLANT LOADS SATISFIED

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

HEATING INPUTS	MBTU SUPPLIED	PCT OF TOTAL LOAD
HW-BOILER	782.3	100.0
LOAD SATISFIED	782.3	100.0
TOTAL LOAD ON PLANT	782.3	
COOLING INPUTS	MBTU SUPPLIED	PCT OF TOTAL LOAD
HERM-REC-CHLR	684.7	100.0
LOAD SATISFIED	684.7	100.0
TOTAL LOAD ON PLANT	684.7	
ELECTRICAL INPUTS	MBTU SUPPLIED	PCT OF TOTAL LOAD
ELECTRICITY	1720.1	100.0
LOAD SATISFIED	1720.1	100.0
TOTAL LOAD ON PLANT	1720.1	

FT BRAGG ENERGY STUDY  
BUILDING 1242  
RE - PS-D PLANT LOADS SATISFIED

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC  
(CONTINUED)-----

## SUMMARY OF LOADS MET

TYPE OF LOAD	TOTAL LOAD (MBTU)	LOAD SATISFIED (MBTU)	TOTAL OVERLOAD (MBTU)	PEAK OVERLOAD (MBTU)	HOURS OVERLOADED
HEATING INPUTS	782.3	782.3	0.000	0.000	0
COOLING INPUTS	684.7	684.7	0.000	0.000	0
ELECTRICAL INPUTS	1720.1	1720.1	0.000	0.000	0

FT BRAGG ENERGY STUDY  
BUILDING 1242  
PORT- BEPS ESTIMATED BUILDING ENERGY PERFORMANCE

HISTORIC RED BRICK BLDG AREA  
BASE CASE

DOE-2.1C 2/21/1995 11: 6:41 PDL RUN 1  
PRESENT ENERGY USAGE  
WEATHER FILE- TMY RALEIGH, NC

ENERGY TYPE  
IN SITE MBTU - ELECTRICITY FUEL-OIL

## CATEGORY OF USE

SPACE HEAT	68.66	1328.59
SPACE COOL	310.70	0.00
HVAC AUX	369.70	0.00
DOM HOT WTR	0.00	0.00
AUX SOLAR	0.00	0.00
LIGHTS	622.17	0.00
VERT TRANS	0.00	0.00
MISC EQUIP	242.60	0.00
	-----	-----
TOTAL	1613.84	1328.59

TOTAL SITE ENERGY	3048.69 MBTU	158.5 KBTU/SQFT-YR GROSS-AREA	158.5 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY	6494.06 MBTU	337.5 KBTU/SQFT-YR GROSS-AREA	337.5 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.0  
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.0

NOTE ELECTRICITY AND/OR FUEL USED TO GENERATE ELECTRICITY IS APPORTIONED BASED  
ON THE YEARLY DEMAND. ALL OTHER ENERGY TYPES ARE APPORTIONED HOURLY.

## **APPENDIX A**

### **SCOPE OF WORK**

APPENDIX A  
for Delivery Order No. 5  
A LIMITED ENERGY STUDY OF FACILITIES IN THE HISTORIC, RED  
BRICK MAIN POST AREA AT FORT BRAGG, NC

1. BRIEF DESCRIPTION OF WORK:

The Architect-Engineer (A-E) shall:

1.1 Site Survey. Perform a limited site survey and investigation of specific facilities to collect all data required to determine the baseline energy consumption of the heating, cooling, and interior lighting systems in various facilities located in the historic portion of the old main post area. There are limited opportunities for conserving water, but a survey of water closets and other water consuming building components is to be performed also.

1.2 Alternatives to be Studied. Evaluate the cost-effectiveness of boiler replacement and conversion to natural gas-fired type; cooling system replacement, conversion, or centralization; building envelope improvements; and various lighting system alternatives to determine their energy savings potential, economic feasibility, and technical applicability based on present conditions and current technical criteria and Army policy.

1.3 Project Identification and Documentation. There are two possible types of projects that may result from this study, as described below in paragraph 2.4. After technical and economic evaluation, the A-E is instructed to provide complete project documentation for the most cost-effective solution(s) to improving heating, cooling, lighting, water consumption, and resistance to heat transfer through building envelopes in these facilities in either of these two project types.

1.4 Study Report. Prepare a comprehensive report to document all work performed, the results and conclusions, and all recommendations. The specifics of this report are more fully described in paragraph 6.

2. SPECIFIC INSTRUCTIONS:

2.1 Site Survey. The primary purpose of this study is to evaluate heating, cooling, lighting, and insulating systems in the twelve (12) facilities listed below:

Building  
Number

Approximate  
Square Footage

2-1105	94,326
2-1120	49,627
2-1127	63,448
2-1133	41,360
2-1138	72,344
1-1242	25,660
1-1333	14,304
2-1728	74,622
2-1731	72,327
1-1326	60,600
1-1434	13,500
2-1549	30,145

The site survey will include verification of facility gross square footage, heated square footage, and cooled square footage; and inventory of heating, cooling, lighting, water consuming, and building insulation systems components (e.g., number of air handlers in each building, boiler types and sizes serving the facilities, types of lighting fixtures, and other component information pertinent to the analysis). The A-E shall document his site survey on forms developed for the survey or on standard forms and shall submit these completed forms as part of the report. If any code violations related to these systems are detected during inspection, they will be documented and the Fort Bragg Energy Coordinator (FBEC) will be notified immediately.

### 2.3 Alternatives to be Studied.

#### 2.3.1 Heating systems:

- Compare (1) replacing existing oil-fired boilers with new oil-fired boilers to (2) replacing existing oil-fired boilers with natural gas-fired boilers and connecting to an 8" gas main located nearby.

- Infrared heat where appropriate

#### 2.3.2 Lighting system alternatives that have been identified for study and evaluation include:

- Replacement of ballasts in existing lighting fixtures with more energy efficient type(s)
- Replacement of existing incandescent lamps with compact fluorescent with or without the use of high grade reflectors
- Replacement of existing fluorescent lamps with more energy efficient fluorescent lamps
- Installation of occupancy sensors in all appropriate areas
- Altered light switching arrangements
- Improved reflection and dispersion with light colored ceilings and walls
- Replacement of existing exit signs with more energy efficient type

#### 2.3.3 Building envelopes:

-- Determine whether upgrading or replacing building envelopes, to include ceiling or roof insulation, wall insulation, weatherstripping and caulking, and/or window replacement, door replacement, or energy-saving treatment of crawl spaces will meet the Savings to Investment Ratio (SIR) and payback period criteria of the energy program. The A-E will need to insure that compliance with all design criteria related to preservation of historic buildings is maintained when making energy improvement recommendations for the building envelopes.

2.3.4 Cooling system alternatives that have been identified for study and evaluation include:

--Replacement of existing equipment with more energy efficient equipment

--Centralized cooling plant to serve all the facilities

2.3.5 For water conservation analysis examine replacement of existing fixtures by water saving water closets and shower heads in all appropriate locations.

2.3.6 The A-E is strongly encouraged to suggest for study other reasonable and practical alternatives or combinations of alternatives that, in his judgment, could possibly provide the most economical means of heating, cooling, insulating, or lighting these facilities. The A-E is instructed to recommend other changes, e.g., to maintenance practices, operational procedures, or controls in these facilities, that will reduce energy consumption in these facilities. Other team members may suggest other alternatives for evaluation during the progress of this study.

2.4 Project Identification and Documentation. There will be two possible types of projects to be identified as a result of this study. Descriptions and documentation requirements for each type are presented below.

2.4.1 Identification of the first type of project, which will require further guidance from the FBEC or the FORSCOM P.O.C. on packaging for funding purposes, will concern the actual heating, cooling, insulating, or lighting system improvement or water conservation projects. Every attempt will be made to keep all projects within the Installation Commander's funding approval authority applicable to the Operations and Maintenance, Army (OMA) account. These limitations are generally \$300,000 for a project classified as construction and \$1,000,000 for projects classified as maintenance or repair, as defined in AR 420-10. To be classified as an OMA Energy maintenance or repair project, the project must result in needed maintenance or repair to an existing facility or replace a failed or failing system or component and result in energy savings. If the project would replace a system or component that is considered failed or failing due solely to obsolete technology or inefficiency, the system or component to be replaced must have been in use for at

least three years and the simple payback period must be ten years or less. So long as the work can be logically separated and identified, projects can be combined in one undertaking. There is a special source of OMA funding called the Federal Energy Management Program (FEMP) that can generally provide funding for energy savings type projects, the cost of which is estimated to fall below these limitations, on a one year cycle or less, if a project is properly justified. Any recommended project must have, as a minimum, a Savings to Investment Ratio (SIR) of 1.25 and a simple payback period of 10 years or less. The documentation required for each project is the life cycle cost analysis (LCCA) summary sheet completely filled out, a description of the work to be accomplished, backup data for the LCCA (i.e., energy and non-energy savings calculations and cost estimate), the SIR, and the simple payback period. The documentation of these projects will be a part of the study report described below in paragraph 6. See paragraph 3.4 for further guidance.

2.4.2 The second, and most intensive, type of project documentation is required for any project that exceeds the funding authorities shown above in paragraph 2.4.1. These are by definition Energy Conservation Investment Program (ECIP) projects. To qualify as an ECIP project, the cost estimate associated with the energy improvement must be at least \$300,000. In addition to the documentation requirements shown above in paragraph 2.4.1, this will include a DD Form 1391 for each project. AR 415-15 provides specific guidance for preparing a DD Form 1391. The other documentation guidance is shown in references 9.4 and 9.8.

### 3. GENERAL

3.1 The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.

3.2 For the buildings listed above and their installed heating, cooling, lighting, and insulating systems, all methods of energy conservation specified and any others which the A-E considers reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All alternatives, or other changes, that are considered during the study will be documented in the report, including those that are rejected because they are considered infeasible with reasons given for elimination.

3.3 The study shall consider the use of all energy sources applicable to each building or system and shall examine the possibility of combinations of heating, cooling, lighting, and insulation systems or other improvements if, for example, some buildings are more suited for certain types of lighting because of building orientation, facility utilization, or floor plan.

3.4 The "Energy Conservation Investment Program (ECIP) Guidance," described in letter from DAIM-FDF-U, dated 10 Jan 1994, and any subsequent revisions establish criteria for ECIP projects and shall be used for performing the economic analyses associated with these projects. The software program, Life Cycle Cost in Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP guidance. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval to the Contracting Officer. The LCCID program is available from the BLAST Support Office at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61901 for a nominal fee. The telephone number is (217) 333-3977 or (800) 842-5278.

3.5 Computer modeling will be used to determine the energy savings of alternatives which would replace or significantly change an existing heating, cooling, or insulating system. Modeling will be done using a professionally recognized and proven computer program or programs that integrate architectural features with heating or cooling systems. These programs will be capable of simulating the features, systems, and thermal loads of the buildings under study. The program will use established weather data files and may perform calculations on a true hour-by-hour basis or may condense the weather files and number of calculations into several "typical" days per month. The program to be used by the A-E will be submitted for approval with a sample run, an explanation of all input and output data, and a summary of program methodology and energy evaluation capabilities, unless it is one of the following: Building Loads and System Thermodynamics (BLAST), DOE 2.1E, Carrier E20 or Hourly Analysis Program (HAP), Trane Air-Conditioning Economics (TRACE).

3.6 The A-E shall take great care to insure that the FBEC is kept apprised of the ongoing work, is regularly consulted from beginning to end, and has every opportunity to input his thoughts and guidance into the study process. The alternatives that become the final recommended projects will be acceptable to the FBEC and will be both technically and economically feasible.

3.7 Public Disclosures. The A-E shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.8 Meetings. Meetings will be scheduled whenever requested by the A-E or the government's representative acting for the installation project manager for the resolution of questions or problems encountered in the performance of the work. These meetings, if necessary, will be in addition to the scheduled review meetings and presentations.

3.9 Site Visits, Inspections, and Investigations. The Contractor shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work. Visits will be coordinated with the FBEC at least a week in advance. The Contractor will determine whether any special security clearances are required with the assistance of the FBEC.

3.10 All invoices or payment estimates (ENG Form 93) will be sent to the Savannah District project manager, who is identified below in paragraph 5.4, for review and approval.

### 3.11 Records

3.11.1 The A-E shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with government personnel relative to this project in which the A-E has participated. These records shall be dated and shall identify the contract number, participating personnel, subject discussed and conclusions reached. The A-E shall forward by letter to the list of P.O.C.'s in paragraph 5 within ten calendar days a reproducible copy of the records. These will also be included in the study report as an appendix.

3.11.2 The A-E shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number. The A-E shall forward to the Savannah District project manager within ten calendar days a reproducible copy of the record of request or receipt of material.

3.12 Interviews. The A-E and Savannah District project manager shall conduct entry and exit interviews with the Director of Public Works and Environment (DPWE), or his designated representative, before starting work at the installation and after completion of the field investigation phase.

3.12.1 Entry. The entry interview shall describe the purpose of the study, the intended procedures for the survey, schedule, names of personnel performing the field investigation and the A-E's project manager, support required by the A-E of the DPWE staff, a description of the final products, and any other information the A-E wishes to communicate and shall be conducted prior to commencing work at the installation.

3.12.2 Exit. The exit interview shall briefly describe the items surveyed, an initial assessment of the condition of existing systems, and the most likely alternatives that will be further analyzed.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor (including that required to research installation records or databases to obtain all information needed to perform a thorough study), supervision, and travel necessary to complete the work and render the data required under this delivery order (D.O.) are to be included in the lump sum price.

5. PROJECT MANAGEMENT

5.1 The A-E shall designate a project manager to serve as the point of contact and liaison for work required under this delivery order (D.O.). Upon award of this D.O., the individual shall be immediately designated in writing. The A-E's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this D.O. The A-E's project manager shall submit monthly progress reports, typically in conjunction with pay requests, and shall telephonically update the Savannah District project manager on project events about every two weeks between pay requests. Immediately upon award of the D.O., the A-E's project manager will submit a project schedule substituting dates for calendar days, with an assumed 30 day government review period after each submittal.

5.2 The Fort Bragg Energy Coordinator and project manager for this effort is Sam Musulin, telephone number (910) 396-1920, FAX number (910) 396-1725. He will assist the A-E in obtaining information and establishing contacts necessary to accomplish the work required under this contract.

5.3 The Forces Command program manager is Naresh Kapur, telephone number (404) 669-5327, FAX number (404) 669-7751.

5.4 The Corps of Engineers, Savannah District, project manager is Rob Callahan, telephone number (912) 652-5246, FAX number (912) 652-5442.

5.5 The Corps of Engineers, Savannah District, Contracting Officers Representative is Ira D. Hefner, telephone number (912) 652-5364, FAX number (912) 652-5442.

5.6 The Corps of Engineers, Mobile District, is the Army's designated Technical Center of Expertise for the EEAP. Mobile District's program manager is Tony Battaglia, telephone number (205) 690-2618, FAX number (205) 690-2424.

6. SUBMITTALS, PRESENTATIONS, AND REVIEWS.

6.1 General. The work accomplished shall be fully documented by a comprehensive report. While the cost of report reproduction is certainly a consideration, the three submittals must be well organized and lend themselves to easy review. The

interim submittal may be copied and bound in the most convenient and least expensive manner, so long as it meets the two criteria above. The pre-final report will be organized, tabbed, copied and bound in the exact manner which the Contractor proposes to produce the final report. Review of this submittal will include comments on the report's organization and flow of thought. The final report will incorporate all earlier comments and, if the pre-final report is produced properly, will be produced by page for page replacement or page addition in the pre-final report. A high quality 3-ring binder will be used to package the pre-final report. For easy reading line length on the printed page is a consideration. It may be advisable to use a two column format to accomplish this. The pages of the original copy will be laser printed. Xeroxed copies on high quality copy paper is acceptable so long as there is essentially no discernible difference between them and the original. A title page will be inserted in a sleeve on the front cover and will contain a photograph descriptive of the report contents. The inside title page will also incorporate logos and credits to the A-E and the offices who have played a role in development of the study and report. This will be followed by a table of contents. Each section, subsection, and appendix shall be separated by a thick paper divider tabbed with the section name and number. Each page will be numbered with a section number followed by a dash and a page number. A separately bound Executive Summary of the study, giving a brief overview of the conclusions and recommendations using graphs, tables, and charts as much as possible, will be prepared. For clarity, color will be used in these graphic elements or any others that appear in the report. The body of the report itself, that portion where the technical analysis, conclusions, and recommendations are developed, shall be organized in a logical manner, written simply enough for a person not an expert in the field to follow the line of reasoning for each project. All project documentation will be presented in this portion of the report. Appendices will include as a minimum the Scope of Work, meeting minutes, survey forms, and code violations found. Any other appendices that the A-E thinks will assist in making the report better and more organized are also encouraged. There will be a list of acronyms used with definitions.

6.2 Interim Report Submittal. An interim report containing all the sections described above, except the Executive Summary, shall be submitted for review after the field survey has been completed and the heating, cooling, insulation, water, and lighting systems analyses have been performed. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken, and contain a plan for the work remaining to complete the study. All alternatives that have been identified for study shall be included. For those that are recommended for elimination from further study reasons for their elimination shall be given. The A-E shall make a presentation of the report at a review conference. Visual aids or other methods of presentation will be at the A-E's discretion to make understanding by those present

easier. One copy each shall be submitted for review to the FORSCOM and Mobile District P.O.C.'s. Two copies each of the report, and one copy of a separately bound notebook of survey forms only, shall be submitted to the Fort Bragg and Savannah District P.O.C.'s. Review comments at this stage of report development will include those pertinent to packaging of projects for funding purposes.

6.3 Prefinal Report Submittal. The A-E shall prepare and submit the prefinal report when all work under this contract is essentially complete. The report will be formatted and bound exactly as the A-E proposes to format the final report. All project documentation shall be completed and included in the report. All comments resulting from review of the interim submittal or from the presentation shall have been addressed in compiling this report, and review action comments related to the interim report shall be included in a separate appendix keyed to sections of the pre-final report where the appropriate changes have been made. The same number of copies shall be sent to the same offices as specified above for the interim report.

6.4 Final Submittal. Any revisions or corrections resulting from comments made during the review of the pre-final report will be able to be incorporated by page for page replacement or page addition in the pre-final report, if it has been produced in accordance with these instructions. All instructions on organization and formatting shall be strictly followed. A separately bound Executive Summary will be prepared, as described above in paragraph 6.1. One copy of the final submittal shall be sent to the FORSCOM and Mobile District P.O.C.'s; two copies shall be sent to the Savannah District P.O.C.; and three copies, along with the original, shall be sent to the Fort Bragg P.O.C. In addition one copy each of only the Executive Summary shall be sent to the Corps of Engineers, South Atlantic Division, P.O.C., the U.S. Army Logistics Evaluation Agency P.O.C., and to the HQUSACE P.O.C. listed below in paragraph 8.

## 7. PROJECT SCHEDULE

<u>Milestone</u>	<u>Date</u>
Entry interview and begin field work	NLT 14 days after NOA of this D.O.
A-E calls in code violations (if any)	As soon as they are discovered
A-E submits interim report	NLT 120 days after entry interview
Interim submittal review meeting and presentation	NLT 30 days after submittal

of interim  
report

A-E submits pre-final report

NLT 60 days  
after receipt  
of government  
review comments  
on interim

A-E submits final report inserts

NLT 30 days  
after receipt  
of government  
review comments  
on pre-final

8. ADDRESSES:

Commander  
XVII Airborne Corps and Fort Bragg  
ATTN: AFZA-PW-M (Mr. Sam Musulin)  
Fort Bragg, NC 28307-5000

Commander  
U.S. Army Forces Command  
ATTN: AFPI-ENO (Mr. Naresh Kapur)  
Fort McPherson, GA 30330

Savannah District, Corps of Engineers  
ATTN: CESAS-PM-MP (Mr. Rob Callahan)  
100 W. Oglethorpe Avenue  
P.O. Box 889  
Savannah, GA 31402-0889

Mobile District, Corps of Engineers  
ATTN: CESAM-EN-CM (Mr. Tony Battaglia)  
P.O. Box 2288  
Mobile, AL 36628-0001

Commander  
U.S. Army Engineer Division, South Atlantic  
ATTN: CESAD-EN-TE (Mr. Baggette)  
77 Forsyth Street, SW  
Atlanta, GA 30335-6801

Commander  
U.S. Army Corps of Engineers  
ATTN: CEMP-ET (Mr. Gentil)  
20 Massachusetts Avenue, NW  
Washington, DC 20314-1000

Commander  
U.S. Army Logistics Evaluation Agency  
ATTN: LOEA-PL (Mr. Keath)  
New Cumberland Army Depot

New Cumberland, PA 17070-5007

9. REFERENCES:

- 9.1 Architect and Engineer Instructions, 9 Dec 91
- 9.2 AR 420-10, Management of Installation Directorates of Engineering and Housing, 2 Jul 87
- 9.3 AR 415-15 (DRAFT), Army Military Construction Program Development and Execution
- 9.4 Energy Conservation Investment Program (ECIP) Guidance, 10 Jan 94
- 9.5 TM 5-785, Engineering Weather Data
- 9.6 TM 5-800-4, Programming Cost Estimates for Military Construction, Feb 94
- 9.7 General Energy Conservation Opportunities
- 9.8 Required DD Form 1391 Data
- 9.9 AR 11-27, Army Energy Program, 14 July 89
- 9.10 TWX dated 111600Z Jul94 from DAIM-FDF-B, subject: Future Change to AR 420-10

**APPENDIX B**

**CORRESPONDENCE**

# SYSTEMS

*corp*

SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION

September 28, 1994

Received

OCT 5 1994

Savannah District, Corps of Engineers  
ATTN: CESAS-PM-MP (Mr. Rob Callahan)  
100 West Oglethorpe Avenue  
P. O. Box 889  
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: Lighting Field Survey Meeting Minutes  
Limited Energy Study of Facilities in the Historic, Red Brick  
Main Post Area and Hangars at Simmons Army Airfield at Fort  
Bragg, NC  
Contract No. DACA01-94-0034

The lighting field survey at Fort Bragg was conducted from 20 September through 23 September 1994. The following is a description of the topics discussed and decisions reached during the field survey:

Tuesday, September 20, 1994

Persons Present:

Rob Callahan	Savannah District COE
Naresh Kapur	Forces Command Representative
Sam Musulin	Fort Bragg DPW Energy Officer
Tommy Brown	Fort Bragg Airfield Commander
Julie Hollensbe	Systems Corp Project Manager
M. Wallace Green	Systems Corp Representative

- Julie Hollensbe passed out a detailed schedule of the projects to be performed on the Red Brick area and the Airfield.
- Tommy Brown will escort Systems Corp through all the Airfield buildings included in the scope of work.
- Sam Musulin will provide Systems Corp with an access letter, 12 months of electric bills and the drawings available on the buildings included in the scope of work.
- Naresh Kapur passed out a brochure on a sky light product he would like evaluated on the hangars.
- The airfield personnel are concerned with the risk of adding sky lights to the hangars and damaging the roofs due to the expensive equipment and material stored in the hangars.

Rob Callahan  
Page 2  
September 28, 1994

- Systems Corp will look for addition future energy projects while surveying.
- The basement of the installation headquarter's building will be the only floor surveyed in this building (Bldg 1326) due to the controlled access.
- The exit interview will follow the second field survey trip in October when all field survey work is completed.

Friday, September 23, 1994

Persons Present:

Sam Musulin	Ft. Bragg Energy Officer
Mr. Walker	Ft. Bragg High Voltage Crew
Julie Hollensbe	Systems Corp Project Manager
M. Wallace Green	Systems Corp Representative

- High pressure sodium lamps in the hangars are 250 watt.
- Metal halide lamps in the hangars are 400 watts.
- Mercury vapor lamps in the hangars are 1000 watts.
- Incandescent lamps in the high bay hangars are 750 and 1000 watts.
- The exterior lamps on the buildings are 400 watt mercury vapor and 250 watt high pressure sodium.
- The street lamps along the perimeter of the airfield are a mixture of 250 and 400 watt high pressure sodium.
- Sam Musulin wants Systems Corp to evaluate replacing the mercury vapor and incandescent fixtures at the hangars with metal halide and not high pressure sodium.

Rob Callahan  
Page 3  
September 28, 1994

If you have any questions or comments regarding this material,  
please do not hesitate to contact me at (708) 462-9150.

Sincerely,

SYSTEMS CORP

*Julie Hollensbe*

Julie Hollensbe, E.I.T.

cc: Sam Musulin, AFZA-PW-M  
Naresh Kapur, AFPI-ENO  
Tony Battaglia, CESAM-EN-CM  
Greg Loflin, Systems Corp (Knoxville)

# SYSTEMS<sub>corp</sub>

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SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION

October 12, 1994

Savannah District, Corps of Engineers  
ATTN: CESAS-PM-MP (Mr. Rob Callahan)  
100 West Oglethorpe Avenue  
P. O. Box 889  
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: Clarification to Lighting Field Survey Meeting Minutes  
Limited Energy Study of Facilities in the Historic, Red Brick  
Main Post Area and Hangars at Simmons Army Airfield at Fort  
Bragg, NC  
Contract No. DACA01-94-0034

The minutes from the Lighting Field Survey was distributed on 28 September 1994. The following are clarifications to the Lighting Field Survey Meeting Minutes:

- Sam Musulin, of Fort Bragg DPW, will assist in the collection of facility drawings.
- The basement of the Headquarter's Building, bldg , will be evaluated for the lighting ECOs. The entire building will be evaluated for all other ECOs.
- The hangars at Simmons Army Airfield will be evaluated for the installation of skylights. It is the decision of the installation the applicability of energy conservation opportunities. Systems Corp was only communicating the concerns of the building occupants.
- The light meters used by Systems Corp are rated to be within .5% of the actual footcandles.
- The Defense General Supply Center's (DGSC) February 1994 High Efficiency Lighting Catalog includes the sky lighting product suggested by Naresh Kapur of Forces Command.

Rob Callahan  
Page 2  
October 12, 1994

- Systems Corp determines the approximate amount of daylight and artificial light by taking light level readings during the day with the lights on and off. This is only to get a general idea of the benefits of additional lighting controls and/or sky lights. The amount of hours a facility can benefit from daylighting controls or skylights is determined through historical weather data. The historical weather data is then used to calculate the proposed savings for each facility.

If you have any questions or comments regarding this material, please do not hesitate to contact me at (708) 462-9150 or Greg Loflin at (615) 521-6536.

Sincerely,

SYSTEMS CORP

*Julie A Hollensbe*

Julie Hollensbe, E.I.T.

cc: Sam Musulin, AFZA-PW-M  
Naresh Kapur, AFPI-ENO  
Tony Battaglia, CESAM-EN-CM  
Greg Loflin, Systems Corp (Knoxville)

# SYSTEMS<sub>corp</sub>

SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION

November 2, 1994

Savannah District, Corps of Engineers  
Attention: CESAS-PM-MP (Mr. Rob Callahan)  
100 West Oglethorpe Avenue  
P.O. Box 889  
Savannah, GA 31402-0889

Dear Mr. Callahan:

RE: HVAC Field Survey Exit Interview  
Limited Energy Study of Facilities in the Historic, Red Brick Main Post Area and  
Hangars at Simmons Army Airfield at Fort Bragg, NC  
Contract No. DACA01-94-0034

The HVAC, envelope and water field survey at Fort Bragg was conducted from 24 October through 28 October 1994. The following is a description of the topics discussed and decisions reached during the field survey:

Thursday October 27, 1994

Persons Present:

Sam Musulin	Fort Bragg DPW Energy Officer
Tommy Brown	Fort Bragg Airfield Commander
Greg Loflin	Systems Corp Project Manager
M. Wallace Green	Systems Corp Representative
Jonathan Driskill	Systems Corp Representative
Bruce Yates	Systems Corp Representative

- Accurate drawings or manufacturer's data for existing HVAC systems are not available for many of the buildings under consideration, particularly in the Red Brick area. Some assumptions will be made based on the information gathered during the site survey.
- Boiler systems were not operating in most facilities during the survey. However, visual inspection and manufacturer's data will provide information as to operating efficiencies.
- Systems Corp representatives will make a return trip to Fort Bragg in mid-November to gather more information as necessary.

Mr. Rob Callahan

Page 2

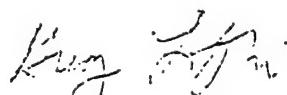
November 2, 1994

- Sam Musulin will provide operational and maintenance cost data for each of the buildings under study as quickly as possible.
- The distance from Simmons Army Airfield to the nearest natural gas line which could provide service to the area is over three miles.
- Code violations reported:
  - (1) Storage of cleaning chemicals in mechanical rooms used as plenum returns in three mechanical rooms of the Headquarters Building (1-1326).
  - (2) Few, if any, of the HVAC Systems in the Red Brick Area meet ASHRAE ventilation requirements for minimum outdoor air flow rates based on occupancy.
  - (3) Several mechanical rooms have no working light fixtures.

If you have any questions or comments regarding this material, please do not hesitate to contact me at (615) 521-6536.

Sincerely,

SYSTEMS CORP



Gregory B. Loflin  
Project Manager

GBL:jal

cc: Sam Musulin, AFZA-PW-M  
Naresh Kapur, AFPI-ENO  
Tony Battaglia, CESAM-EN-CM

**APPENDIX C**

**RESPONSE TO**

**REVIEW COMMENTS**

**RESPONSE TO  
INTERIM REVIEW  
COMMENTS**

<b>Project Review Comments</b>			
Interim	✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area
Pre-Final	<input type="checkbox"/>	Location:	Fort Bragg, NC
Final	<input type="checkbox"/>	Year:	P.N.
Reviewer: COE-SAVANNAH Page: <u>1</u> of <u>1</u> DISTRICT FULTON Date: <u>2/03/95</u>			
Name: Organizer:			

				<b>COMMENTS</b>		<b>RESOLUTIONS</b> (include location of documents)		Ref.
Comment No.	Vol.	Sec.	Page	Action Code				
1		ECO-1		<input type="checkbox"/> Struc. <input type="checkbox"/> Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech. <input type="checkbox"/> Elec. <input type="checkbox"/> San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other	A	Concur.		
2		ECO-2		Should be abandoned as hopeless.	A	Concur.		
3		ECO-3		Is an excellent opportunity to realize real savings at a modest cost.	A	Concur.		
4		ECO-4		Has the greatest pay-off of all, and this reviewer highly recommends it.	A	Concur.		
5		ECO-5		Should not be considered further; outside of prescribed parameters.	A	Concur.		
6		ECO-6		Should be the subject of a building-by-building analysis. Some buildings can benefit from new HVAC systems, while others are very marginal.	N	ECO-6 was performed as a building-by-building analysis.		
7		ECO-7		Should not be considered further.	A	Concur.		

**ACTION CODES:**  
A - Accepted/Concur

D - Action Deferred

N - Non-concur

VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>				Interim ✓	Project: Limited Energy Study of Historic Red Brick Main Post Area	Reviewer: HQ FORSCOM	Page: 1 of 3
				Pre-Final <input type="checkbox"/>	Location: Fort Bragg, NC	Name: NARESH K. KAPUR P.E.	Date: 2/16/95
				Final <input type="checkbox"/>	Year: P.N.	Organizer:	

Comment No.	Vol.	Sec.	Page	COMMENTS		Action Code	RESOLUTIONS (include location of documents)	Ref.
				□ Struc.	□ Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech. <input type="checkbox"/> Elec. □ San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other			
1	Field Notes	1	1	Not clear if ballasts are magnetic or electronic.		A	All existing ballasts are magnetic.	
2	Field Notes	1	5	Hours of operation - 10. How many days a week? How many hours a year? Corridors/latrines are expected to be lighted for more hours. Please clarify in the Field Notes wherever similar situations exist.		A	Field Notes have been modified to make information clearer.	
3	Field Notes	1	15	In Building 1728, one office has 23 fixtures - 2x4 - four lamps each. Lighting levels of 100-125 FC are indicated. Any special treatment for this area? Similar situation may exist in other buildings.		A	Field Notes have been modified to make information clearer.	
4	Field Notes	1	29	For water closets, two GPF is indicated. How was this figure determined?		A	Existing water usage was determined by manufacturer's data from flush valves.	
5	1	---	---	General. As far as possible, give brief (or abbreviated) title following ECO numbers. This applies to Table of Contents and various tabulations also.		A	Titles have been modified.	
6	1	2	14	For ECO-6, please evaluate all HVAC systems including those less than five (5) years old. Check if equipment is oversized. If there is potential for a cost effective retrofit/replacement, we can program for a future fiscal year.		A	Systems were analyzed for over sizing, general condition, and performance.	

**ACTION CODES:**  
A - Accepted/Concur      D - Action Deferred

N - Non-concur      VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>		Interim ✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area	Reviewer: HQ FORSCOM	Page: 2 of 3
		Pre-Final <input type="checkbox"/>	Location:	Fort Bragg, NC	Name: NARESH K. KAPUR	Date: 2/16/95
		Final <input type="checkbox"/>	Year:	P.N.	Organizer: P.E.	

Comment No.	Vol.	Sec.	Page	COMMENTS	Action Code	RESOLUTIONS (include location of documents)	Ref.
7	1	3	1	<input type="checkbox"/> Struc. <input type="checkbox"/> Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech <input type="checkbox"/> Elec. <input type="checkbox"/> San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other <p>Expanded description would be preferred to what is currently provided. This is particularly the case with lighting ECOs. It may involve different solutions in different areas. As such, each sub-ECO should be separately dealt with, e.g. lighting in corridors, offices, bath rooms have different requirements (hrs, FC, etc.). It would help to include general observations about field conditions. Address the questions like if delamp would be practical or replacement of 2-lamp fixtures by one lamp fixtures is viable? If possible, provide catalog cutspictures of the proposed retrofits. In short, ECO description should be a gist of architectural engineering observations in the field and proposed solutions thereof.</p>	A	Descriptions of ECOs have been expanded.	
8	1	3	5	Is 5% design cost realistic? Let us discuss.	A	Based on Interim Review discussions, no change is necessary.	
9	1	3	7	For compact fluorescent, material and labor cost of \$2.00 is mentioned. Please verify and follow up if necessary.	A	Cost is for replacement compact fluorescent lamp currently available through the General Supply Agency.	
10	1	5	22	We like to see a sort of all ECOs by building number which meet the ECIP criteria.	A	See Table 5.4.4.	
11	2	6	---	<p>Most of buildings do not meet ECIP criteria for lighting ECO. Suggest Architect Engineer explore a more reasonable way of estimating lighting retrofit. Instead of considering demolition and installation as separate operations, consider it as a single operation. Economy of scale will result in a lower unit cost. Also, consider doing separate LCCAs for different functional areas like corridors, offices, etc. If individual sub-ECOs qualify, we can recommend these and look at other alternatives for those failing ECIP criteria test.</p>	A	Lighting ECOs have been further subdivided for analysis. See Sections 5 and 6.	

**ACTION CODES:**  
A - Accepted/Concur

D - Action Deferred

N - Non-concur

VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>		<input checked="" type="checkbox"/> Interim	<input type="checkbox"/> Pre-Final	Project:	Limited Energy Study of Historic Red Brick Main Post Area	Reviewer:	HQ FORSCOM	Page: <u>3</u> of <u>3</u>
		<input type="checkbox"/> Final	<input type="checkbox"/> Final	Location:	Fort Bragg, NC	Name:	NARESH K. KAPUR P.E.	Date: <u>2/16/95</u>
				Year:	P.N.	Organizer:		

Comment No.	Vol.	Sec.	Page	Comments	Action Code	RESOLUTIONS (Include location of documents)	Ref.
12	--	--	--	<input type="checkbox"/> Struc. <input type="checkbox"/> Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech. <input type="checkbox"/> Elec. <input type="checkbox"/> San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other <p>Let us make this review process a cooperative effort which should result in an end product we all can be proud of. With that in mind, Systems Corp is requested to respond in detail as to what and how the follow-up actions will be taken to satisfy the review comments. We are willing to work with Systems Corp to make it happen. The lessons learned and most of the improvements made in one EEAP study should be used in future FORSCOM studies as far as practical.</p>	Concur.  A		

**ACTION CODES:**

#### D - Action Deferred

VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>		Interim	✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area	Reviewer: FORT BRAGG DPWE	Page: <u>1</u> of <u>2</u>
		Pre-Final	<input type="checkbox"/>	Location:	Fort Bragg, NC	Name: SAM MUSULIN	Date: <u>2/06/95</u>
		Final	<input type="checkbox"/>	Year:	P.N.	Organizer:	

				<b>COMMENTS</b>		<b>RESOLUTIONS</b> (include location of documents)		Ref.
Comment No.	Vol.	Sec.	Page	Action Code				
1	1	Field Notes		<input type="checkbox"/> Struc. <input type="checkbox"/> Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech. <input type="checkbox"/> Elec. <input type="checkbox"/> San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other	A	Field Notes and Table of Contents have been broken out by HVAC, Water and Building Envelope sections.		
2	1	Table 5.3.3.1		Delete Building 1-1326 from consideration for water conservation. This is the Headquarters Building. Recalculate ECO-3 for remaining tables. Will discuss further at meeting on Feb. 22, 1995.	W	On further discussion at the Interim Review meeting it was decided to leave Building 1326 in the calculations.		
3	1	Table 5.4.4		Building 2-1549 is listed twice - for gas and oil.	A	For Building 2-1549, ECO-5 has been removed from the Recommended Table.		
4	2		6-78	Electronic ballasts will cause problems at a telephone switching facility. Suggest deletion from lighting upgrade candidate list.	A	Building 1-1434 has been deleted for consideration in this ECO.		
5	2		6-112	Incandescent, MV, and Exit Sign retrofit can be lumped into one project under ECO-1.	A	ECO-1 has been broken into further sub-ECOs as requested.		
6	2		7-1	None of these ECOS panned out together. How about separately, i.e. roof insulation for all buildings, etc.?	A	ECOs have been reanalyzed separately. See Section 5.3.2.		

**ACTION CODES:**  
A - Accepted/Concur  
D - Action Deferred

N - Non-concur  
VE - VE Potential/VEP Attached

W - Withdrawn

Project Review Comments		Interim	✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area Fort Bragg, NC P.N.		Reviewer:	FORT BRAGG	Page: <u>2</u> of <u>2</u>
		Pre-Final	<input type="checkbox"/>	Location:	SAM MUSULIN		Name:	DPWE	Date: <u>2/06/95</u>
		Final	<input type="checkbox"/>	Year:			Organizer:		

**ACTION CODES:**

D - Action Deferred

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VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>			
Interim	✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area Fort Bragg, NC P.N.
Pre-Final	<input type="checkbox"/>	Location:	
Final	<input type="checkbox"/>	Year:	

Comment No.	Vol.	Sec.	Page	COMMENTS			Action Code	(include location of documents)	Ref.
				<input type="checkbox"/> Struc.	<input type="checkbox"/> Arch.	<input type="checkbox"/> Civ.	<input type="checkbox"/> Mech.	<input type="checkbox"/> Elec.	
1	1	2	2	Section 2 needs some reorganization. As it is presently submitted, it is not easy to follow. Also, combine Tables 2.3.1.1 through 2.3.7.1 into one table summarized in a matrix. A copy of the tables in Section 5.3 should be included in Section 6 through 12 for easy reference. A suggested organization of Section 2 is as follows:			N	Customer comments at Interim Review meeting were in favor of keeping report organization as presented at interim.	
				Section 2.1 - Field Survey, Table 2.1.1					
				Section 2.3 - ECOS, Table 2.3.1, Matrix Table					
				Section 2.2 - Baseline Energy, Tables 2.2.1.1 through 2.2.3.1					
				Section 2.4 - Field Notes					
2	1	2 and 5		Define baseline energy consumption in terms of fuel sources.			N	Customer wants extraneous information kept to a minimum in report body. Detailed information can be found in Volume 2 if needed.	
3	1	2	2-15	What were the different options involved in ECO 6.				Table 5.3.6.1 gives building-by-building description of analysis.	
4	1	5	5	Suggest putting the appropriate table after each narrative. See Comment #1. A table was not provided for ECO-2.			A	Has been corrected; table is provided for ECO-2.	
5	1	5	5-23	Project grouping should only include the recommended ECOS in Table 5.4.2.			A	Concur.	
6	2	7		Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown.			A	See new Section 13 with sample DOE 2 input and output.	

**ACTION CODES:**  
A - Accepted/Concur

D - Action Deferred  
N - Non-concur

VE - VE Potential/VEP Attached

V - Withdrawn

Reviewer: COE-SAVANNAH  
DISTRICT WILLIAMS  
Name: Date: 1 of 3  
2/10/95

Organizer:

<b>Project Review Comments</b>		Interim	✓	Project:	Limited Energy Study of Historic Red Brick Main Post Area P.N.	Reviewer: COE-SAVANNAH DISTRICT WILLIAMS	Page: <u>2</u> of <u>3</u>
		Pre-Final	<input type="checkbox"/>	Location:	Fort Bragg, NC	Name: <u></u>	Date: <u>2/10/95</u>
		Final	<input type="checkbox"/>	Year:	P.N.	Organizer: <u></u>	

Comment No.	Vol.	Sec.	Page	COMMENTS		Action Code	RESOLUTIONS (include location of documents)	Ref.
				□ Struc.	□ Arch. □ Civ. □ Mech. □ Elec. □ San. □ Env. □ Fire □ Other			
7	2	8 - ECO-3		How were the existing and proposed liters/flush determined? Also, include all the assumptions made. Provide backup calculations for annual dollar savings and cost estimates. The number of fixtures shown for Building 1-1333 does not agree with the number shown in Table 5.3.3.1. This comment applies to both the urinal and water closet ECOs.	A		Existing water usage was determined by manufacturer's data for each flush valve. Proposed usage is based on new valve's consumption data. Calculations are provided in Section 8. Fixture numbers have been corrected for Building 1-1333.	
8		8 - ECO-3		How were the existing and proposed usage determined? Also, include all the assumptions made. Provide backup calculations for annual water and oil dollar savings and cost estimates. Since this portion of ECO-3 was not recommended, it should not be included in the overall ECO-3 evaluation. All discrete portions of an overall ECO must be recommended ECOs.	A		Existing water usage was determined by manufacturer's data for each faucet. Proposed usage is based on new faucet's consumption data. Calculations are provided in Section 8.	
9		8 - ECO-3		How was the existing and proposed usage determined? Include all the assumptions made. Provide backup calculations for annual water and oil dollar savings and cost estimates.	A		Existing water usage was determined by manufacturer's data for each flush valve. Proposed usage is based on new valve's consumption data. Calculations are provided in Section 8.	
10		9 - ECO-4		Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown. The LCC sheet for Building 1-1333 is incomplete.	A		See new Section 13 with sample DOE 2 input and output. LCCA for Building 1-1333 has been corrected.	
11		10 - ECO-5		Provide one sample calculation to show how you computed the energy figures shown in the LCCA based on the computer output shown.	A		See new Section 13 with sample DOE 2 input and output.	

**ACTION CODES:**  
A - Accepted/Concur

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VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>		<input checked="" type="checkbox"/> Interim <input type="checkbox"/> Pre-Final <input type="checkbox"/> Final	<input checked="" type="checkbox"/> Project: Historic Red Brick Main Post Area Fort Bragg, NC P.N.	<input type="checkbox"/> Location: Year:	Reviewer: COE-SAVANNAH DISTRICT WILLIAMS Name:	Page: <u>3</u> of <u>3</u> Date: <u>2/10/95</u>
						Organizer:

**ACTION CODES:**

D - Action Deferred

N - Non-concur

VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>			Interim      ✓      Project:      Limited Energy Study of Historic Red Brick <b>Main Post Area</b> Fort Bragg, NC P.N.	Reviewer:      COE - MOBILE DISTRICT ROBERT S. WOODRUFF	Page:      1      of      1
			Pre-Final <input type="checkbox"/> Location: Year:	Name:	Date:      2/06/95
			Final <input type="checkbox"/> P.N.	Organizer:	

<b>COMMENTS</b>				<b>RESOLUTIONS</b> (include location of documents)	
Comment No.	Vol.	Sec.	Page	Action Code	Ref.
1		ECO-2		A	Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (See Section 13.)
2		ECO-3		N	The costs are for new flush valves only, not for new fixtures.
3		ECO-4		A	Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (See Section 13.)
4		ECO-5		A	Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (See Section 13.)
5		ECO-6		N	Each HVAC improvement was run individually as it applied to each building.
6		ECO-7		A	Expanded descriptions of ECOs have been included in Pre-Final submission. Also, a sample DOE 2 input and output file has been included. (See Section 13.)

**ACTION CODES:**  
A - Accepted/Concur      D - Action Deferred

N - Non-concur      V - VE Potential/VEP Attached

W - Withdrawn

**RESPONSE TO  
PRE-FINAL REVIEW  
COMMENTS**

<b>Project Review Comments</b>				Interim <input type="checkbox"/> Project: Limited Energy Study of Historic Red Brick Main Post Area	Reviewer: HQ FORSCOM	Page: 1 of 2
Pre-Final <input checked="" type="checkbox"/> Location: Fort Bragg, NC Final <input type="checkbox"/> Year: P.N.				Name: NARESH K. KAPUR P.E.	Date: 3/31/95	Organizer:
Comment No.	Vol.	Sec.	Page	COMMENTS	RESOLUTIONS (Include location of documents)	Ref.
1				<input type="checkbox"/> Struc. <input type="checkbox"/> Arch. <input type="checkbox"/> Civ. <input type="checkbox"/> Mech. <input type="checkbox"/> Elec. <input type="checkbox"/> San. <input type="checkbox"/> Env. <input type="checkbox"/> Fire <input type="checkbox"/> Other <p>We requested evaluation of all HVAC systems less than five years. What was the result of these evaluations?</p>	A	All systems were evaluated based on general condition, performance and proper sizing. Systems, which could be improved from an energy efficiency and/or maintenance viewpoint were analyzed under this ECO. Other systems which did not meet this criteria were not evaluated for this ECO, as the stated criteria was the basis for the analysis. The result was that the systems could not be recommended for replacement on the basis of energy savings or maintenance savings.
2				<p>It is not clear if \$2.00 represents the cost of material and labor, as per the column reading. Please clarify and make changes as necessary.</p>	A	The cost represents material and labor as indicated.
3				<p>Systems Corp is commended for their efforts to dig into ECO-1 and make it look better. Somehow we should be able to identify the areas in each building where these retrofits will be used. Cross referencing will make this very user friendly. How can this be handled? Also, see Comment 10.</p>	A	Lighting Field Notes have been modified to indicate building area and proposed fixture replacement as requested at the Interim Review Meeting.
4				<p>For ECO-3, ECO-4, and ECO-6, provide investment costs similar to ECO-1.</p>	A	Investment costs were added to sections as requested.
5				<p>Executive Summary</p> <p>1-2 1-3</p>	A	Replace heading ECO number by ECO Number>Title. For example ECO-4 will be replaced by 4/NG HTG. ECO-3 Water Conservation needs to be included in this table. Similar changes are desirable in similar tables to make them user friendly. Wherever appropriate, provide overall dollar figures, overall SIR, and overall simple pay back at the bottom of the table.
6				<p>Executive Summary</p> <p>1-12 1-13</p>	A	See Comment 5.
7				<p>Executive Summary</p> <p>1-14</p>	A	What is the use of this table? We would rather have recommended ECOS overal figures.
					A	Modifications made as requested.
					A	Table 1.1.4 on pages 1-12 and 1-13 modified as requested.
					A	Table 1.1.4 on pages 1-12 and 1-13 modified as requested.

**ACTION CODES:**  
A - Accepted/Concur      D - Action Deferred

N - Non-concur  
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<b>Project Review Comments</b>				Reviewer: HQ FORSCOM	Page: <u>2</u> of <u>2</u>
Interim	<input type="checkbox"/>	Project:	Limited Energy Study of Historic Red Brick Main Post Area Fort Bragg, NC P.N.		
Pre-Final	<input checked="" type="checkbox"/>	Location:			
Final	<input type="checkbox"/>	Year:			
				Name: NARESH K. KAPUR P.E.	Date: <u>3/31/95</u>
				Organizer:	

Comment No.	Vol.	Sec.	Page	COMMENTS		Action Code	(Include location of documents)	Ref.
				<input type="checkbox"/> Struc.	<input type="checkbox"/> Arch.	<input type="checkbox"/> Civ.	<input type="checkbox"/> Mech.	<input type="checkbox"/> Elec.
8		5		Add abbreviated ECO title following ECO # in headings as well as columns of the tabulations.		A	Tables in Section 5 modified as requested.	
9		5	5-23 5-24	Include ECO-3. If ECOs are non-competing, provide overall dollar, SIR, and payback at the bottom of the table.		A	Tables modified as requested.	
10		6		It is not very clear what parts of the building are included in each sub-ECO. Table of Contents can be modified for this purpose. For example, we could add (corridors, bath rooms, and stair areas, etc) following Life Cycle Cost Analysis for Building...., ECO.....		N	Sub-ECOs are based on schedule of use and number of hours per day and week as indicated on page 6-1. Reference Field Notes.	
11		6		During last interim review meeting, Systems Corp Rep was shown one-lamp fluorescent fixtures at 12-16 feet C/C in a corridor of Moon or Hardy Hall at Fort Bragg. Everyone in the group was impressed by that energy efficient layout of that corridor lighting. Has that kind of possibility been considered or used in the analysis of lighting in these buildings' corridors, if applicable?		A	This has been considered where applicable.	
12		11	11-1	First line. Replace ECO-11 by ECO-6.		A	Correction completed as requested.	

**ACTION CODES:**  
A - Accepted/Concur  
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VE - VE Potential/VEP Attached

W - Withdrawn

<b>Project Review Comments</b>			Interim <input type="checkbox"/>	Project:	Limited Energy Study of Historic Red Brick Main Post Area	Reviewer: COE-SAVANNAH DISTRICT FULTON	Page: <u>1</u> of <u>1</u>
			Pre-Final <input checked="" type="checkbox"/>	Location:	Fort Bragg, NC	Name:	Date: <u>4/10/95</u>
			Final <input type="checkbox"/>	Year:	P.N.	Organizer:	

Comment No.	Vol.	Sec.	Page	COMMENTS		Action Code	RESOLUTIONS (include location of documents)		Ref.
				<input type="checkbox"/> Struc.	<input type="checkbox"/> Arch.	<input type="checkbox"/> Civ.	<input type="checkbox"/> Mech.	<input type="checkbox"/> Elec.	
1		5	21	Suggest that ECO 1.2, Bldg 2-1120; ECO 1.1 Bldg 2-1138; ECO 1.1 Bldg 1731 be reconsidered for implementation. The pay backs are acceptable and the SIRs are barely below the guidelines.		A	ECO 1.2, Bldg 2-1120, ECO 1.1 Bldg 2-1138, and ECO 1.1 Bldg 1731 have been added to recommended list Table 5.4.2.		
2		6	2	Table 6.1 is slightly confusing about incandescent. Replacement fixtures are compact fluorescent which is fine but under notes you say that incandescents larger than 200 watts will be replaced with 2-lamp F-32 T-8 fixtures. I think if you show in the existing fixture column incandescents under 200 watts and incandescents over 200 watts with the appropriate replacement, it would be clearer.		A	Table 6.1 has been modified as requested.		
3				The study is very well done.					

**ACTION CODES:**

N - Non-concur

#### D - Action Deferred

VE - VE Potential/VER Attached

W - Withdrawn

<b>Project Review Comments</b>			Reviewer: DPWE FORT BRAGG	Page: <u>1</u> of <u>1</u>
Interim	<input type="checkbox"/>	Project: <b>Limited Energy Study of Historic Red Brick Main Post Area</b>	Name: SAM MUSULLIN	Date: <u>4/18/95</u>
Pre-Final	<input checked="" type="checkbox"/>	Location: <b>Fort Bragg, NC</b>	Organizer:	
Final	<input type="checkbox"/>	Year: <b>P.N.</b>		

**ACTION CODES:**

N - Non-canc.

#### D - Action Deferred

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VEE - VEE Potential/VEP Attached

W - Withdrawn